Vol. XXXII JANUARY, 1956 No. 1

THE PAN-PACIFIC ENTOMOLOGIST

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SAN FRANCISCO, CALIFORNIA • 1956

Published by the PACIFIC COAST ENTOMOLOGICAL SOCIETY
in cooperation with THE CALIFORNIA ACADEMY OF SCIENCES

THE PAN-PACIFIC ENTOMOLOGIST

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Published quarterly in January, April, July, and October with Society Proceedings appearing in the January number. Papers on the systematic and biological phases of entomology are favored, including articles up to ten printed pages on insect taxonomy, morphology, life history, and distribution.

Manuscripts for publication, proof, and all editorial matters should be addressed to Dr. P. D. Hurd, Jr., at 112 Agricultural Hall, University of California, Berkeley 4, Calif. All communications regarding non-receipt of numbers, changes of address, requests for sample copies, and all financial communications should be addressed to the treasurer, Dr. R. C. Miller, at the California Academy of Sciences, San Francisco 18, California.

Domestic and foreign subscriptions, $4.00 per year in advance. Price for single copies, $1.00. Make checks payable to "Pan-Pacific Entomologist."

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Entered as second class matter, February 10, 1925, at the post office at San Francisco, under act of August 24, 1912.

The Pan-Pacific Entomologist

Vol. XXXII January, 1956 No. 1

BEES OF THE GENUS CENTRIS IN CALIFORNIA

(Hymemoptera: Anthophoridae)

Roy R. Snelling

Turlock, California

The anthophorid bees of the genus *Centris*[1] have been something of a problem with workers of bees for some time. The genus is a large one, and the number of names proposed for species probably exceeds the actual number of species by quite a great margin. Many species have never been properly described, if at all, while others have been described many times under many names (*e.g. Centris versicolor* Fabricius). With exception of certain tropical species, most of these bees are rather stable, and redescription has probably been the result of incorrect determinations and of not having actually seen the types of species. In this study the author has studied the types of several forms, and other names are based upon authentically determined material.

The earliest attempt to prepare a key for the determination of Nearctic *Centris* is that of Cockerell (1897) which proved to be unworkable as more material became available. The later key of Fox (1899) is still workable for determination of the species known at that time. The principal value of this work is that valid specific characters are brought into use for the first time. The tables of Friese (1900) are of no real value for our species as he relied largely upon the original descriptions and such poor characters as the color of the pubescence, body and wings, and upon size. Michener (1950) has prepared an excellent key to the subgenera.

The author wishes to express his thanks to Dr. C. D. Michener

[1] The author is herein using **Centris** in the sense of Cresson, Cockerell and other authors prior to Sandhouse (1943, U. S. Nat. Mus. Proc. 92:519-619). As Sandhouse pointed out, this name should be used for the euglossine genus which has long been called **Eulaema**, while the genus herein under consideration should be known as **Hemisia**. However, in view of the extensive literature which has been built up around use of the names **Centris** and **Eulaema** (prior to Sandhouse), C. D. Michener and I feel that it would be much less confusing if the rules of the International Commission on Zoological Nomenclature were suspended in these cases, in order that these names may be used in the same sense as they have been in the past. Dr. Michener has made an application to the Commission in regard to this matter.

for many valuable suggestions made while the research for this paper was in progress, and for reading and correcting the unfinished manuscript. Grateful acknowledgment is also made to P. H. Timberlake for the loan of certain specimens and for making numerous valuable criticisms on the manuscript.

Key to California Species of Centris[2]

Females

1. Clypeus strongly protuberant, seen from side as far in front of base of mandibles as width of eyes, finely, sparsely punctate, with a large median impunctate area, black, without macula; pubescence of mesoscutum, scutellum and metanotum dark fox-red (wings pale fuliginous, subhyaline, veins and stigma black; first tergum with long erect pubescence, remaining terga sparsely pubescent; basal area of propodeum, except apex, dull, tessellate; inner mandibular margin with three long, subacute teeth, apical tooth very long, subacute) ..... *rhodomelas*
– Clypeus only moderately protuberant, often very shiny, black, red or yellow, with or without macula; thoracic pubescence varying from light fulvous to white; mandibles variable 2
2. Maxillary palpi four-segmented; pubescence mostly pale whitish, surfaces of abdominal terga hidden by short, appressed pubescence 3
– Maxillary palpi five-segmented; pubescence fulvous to ochraceous; at least four apical terga in large part bare 4
3. Large species, 13–16 mm.; mandibles tridentate; abdominal ventrites three to five with distinct apical fringes of moderately long white hairs ..... *pallida*
– Smaller, 11.5–13 mm.; mandibles quadridentate; ventrites lacking the white apical fringes ..... *tiburonensis*
4. Large species 13–16 mm.; clypeus black or with apical yellow spot; legs black or darkly rufescent; clypeus distinctly punctate; surface of second tergum obscured by short appressed pubescence 5
– Smaller 12–14 mm.; clypeus red or yellow; legs variable often red; second tergum without surface obscured by appressed pubescence 6
5. Eye, seen from side, wider than genae; clypeus bulging basally, always with a small apical yellow macula; pubescence of second tergum subappressed, pallid; ventrites three to five with pale apical fringes; coastal and desert species ..... *hoffmanseggiae*
– Eye, seen from side, no wider than genae; clypeus weakly bulging basally, with a large shiny median impunctate area, entirely black; pubescence of second tergum usually strongly appressed, usually dark or with apical and lateral areas pallid; ventrites without pale apical fringes; primarily of the San Joaquin Valley ..... *californica*
6. Greatest facial width greater than distance between the anterior ocellus and apex of clypeus; legs mostly red, pubescence black, except on anterior femora and tibiae; apical margins of terga two and three

[2]The female of **rhodoleuca** Cockerell and the male of **californica** Timberlake have not been included in this key as they apparently are unknown.

laterally with pale fasciae; clypeus, labrum, inner orbits for a short distance, mandibles except apices, red (clypeus sparsely punctate, with fine punctation on extreme lateral and basal margins; labrum deeply punctate, with shining interstices; first segment of flagellum almost as long as scape, distinctly shorter than following three segments combined; propodeum very sparsely punctate; postscutellum shinier than scutellum) ..... *rhodopus*

– Greatest facial width less than distance between anterior ocellus and apex of clypeus; legs black or dark brown, rarely lightly rufescent..... 7

7. Apical width of clypeus hardly greater than its median length; labrum small, subtriangular, subacuminate at apex; sternal pubescence of thorax pale or lightly tinged with brownish..... *lanosa*

– Apical width of clypeus greater than its median length; labrum larger, semilunate, its apex broadly, roundly slightly emarginate; sternal pubescence of thorax usually strongly black or dark brownish..... *atripes*

Males

1. Posterior femora strongly swollen, one-half to one-third as broad as long; body entirely covered by long dense, shaggy, pallid pubescence; abdomen dull red basally, remainder of body dull black; legs mostly dull red ..... *rhodoleuca*

– Posterior femora usually about one-fourth as broad as long, rarely (in Nearctic fauna) almost one-third as broad as long; if body covered with pubescence, then pubescence short, integument of abdomen shining black 2

2. Maxillary palpi four-segmented; abdominal dorsum entirely hidden by short pallid pubescence 3

– Maxillary palpi five-segmented; abdominal dorsum not hidden by pubescence beyond first segment..... 4

3. Larger species 13–16.5 mm.; face narrow, inner orbits strongly converging above ..... *pallida*

– Smaller species, 12–13.5 mm.; face broader, inner orbits almost parallel ..... *tiburonensis*

4. Large species, 13–16 mm.; legs and abdomen black; maculae of face pale yellow 5

– Species of smaller maximum size, usually about 13 mm.; legs often reddish; abdomen often reddish basally; maculae of face bright lemon-yellow 6

5. Clypeus strongly protuberant, as far in front of mandibular base as eye is wide when viewed laterally; first flagellar segment shorter than following four combined; supraclypeal area and underside of scape, in addition to clypeus and labrum, yellow; pubescence of vertex and thoracic dorsum often dark fox-red, but varying to fulvous..... *rhodomelas*

– Clypeus not as strongly protuberant as noted above; first flagellar segment as long as following four combined; supraclypeal area and underside of scape black; pubescence as noted above usually ochraceous ..... *hoffmanseggiae*

6. Face broad, distance from apex of clypeus to anterior ocellus no greater

than greatest facial breadth; legs pale reddish; terga two to five with at least lateral apical fringes of pallid pubescence.....*rhodopus*

– Face narrow, distance from apex of clypeus to anterior ocellus greater than greatest facial breadth; legs brown or blackish; terga two to five without pale apical fringes.....7

7. Pubescence of thoracic sternum dark brown or blackish, that of mid and posterior legs entirely black; first flagellar segment shorter than following two combined; inner orbits diverging above.....*atripes*

– Pubescence of thoracic sternum pale or with a slight admixture of brownish hairs; middle tibiae and posterior femora externally with pale pubescence; first flagellar segment as long as the following three combined; inner orbits converging above.....*lanosa*

Trichocentris Snelling, new subgenus

This subgenus is mostly closely allied to *Penthemisia* Moure from which it hardly differs except in the swollen hind legs and the heavy tibial spurs and tarsal claws. This subgenus is known only from the males of three species, one of which is apparently undescribed. One of the species included here (*C. morsei* Cockerell) does not agree too well with the other species, but rather than erect a new subgenus (which would tend to obscure the subgeneric relationships) for it, I am including it here provisionally. *Centris vanduzeei* Cockerell, described from the Gulf of California, may prove to be a *Trichocentris*, but the types will have to be restudied before this is clear. The female of *vanduzeei* has the abdomen thinly covered with erect white pubescence, with whitish fasciae on the apical margins of the terga. The face is black. The male differs from any known *Trichocentris* in that the face is entirely black. In the closely related subgenus *Penthemisia*, however, the males of a few species (e.g. *mexicana* F. Smith and *aterrima* F. Smith) have the face immaculate, so this is probably merely an interesting specific character.

If *vanduzeei* should eventually prove to be a member of this subgenus, then we have an interesting situation, for the secondary basitibial plate of the female of this species is very poorly developed, while the genitalia of the three species which I have studied have the large branched setae of the gonocoxites which are characteristic of the subgeneric complex including *Penthemisia, Centris s. str.*, and *Xanthemisia*. This would seem to indicate, therefore, that *Trichocentris* is a rather primitive type, from which this complex may have evolved. With *Trichocentris* as the most primitive type, one line of development (by retention of

the setae of the gonocoxites, shortening of the apical segments of the maxillary palpi, development of a basitibial plate with a secondary plate) leads to the *Penthemisia, Centris s. str.*, and *Xanthemisia* complex, while another line leads to *Wagenknechtia* and the remaining subgenera in which the males lose the branched setae and where the maxillary palpi are reduced to three or four segments, all of these segments being quite long as compared to the *Penthemisia* complex.

The characters by which *Trichocentris* may be recognized are as follows:

Mandibles slender, tridentate, inner tooth much smaller than in *Penthemisia*, acute; maxillary palpi five-segmented, two apical segments distinct from one another, fourth as long as basal, fifth longer than basal; first flagellar segment of antennae slightly longer than scape; clypeus and labrum smooth, nearly impunctate, bright lemon-yellow; first recurrent vein of forewings reaching second submarginal cell at end of basal third; hind femora swollen, one-half to one-third as broad as long (usually about one-fourth as broad as long in *Penthemisia*); tibial spurs blunt, flattened; tarsal claws dentate, the inner tooth very long so that they appear almost bifid, very stout; apical processes of seventh and eighth ventrites slender; giant branched setae of gonocoxites quite long, not as well developed as in other subgenera of this complex, arising near the bases of the gonostyli; gonocoxites without apical processes; large robust species, body usually covered with long, dense, shaggy pallid pubescence.

Type of subgenus: *Centris rhodoleuca* Cockerell, 1923.

Most of the species in this subgenus appear to be rather rare, or at least are uncommon.

CENTRIS RHODOLEUCA Cockerell

Centris rhodoleuca Cockerell, 1923. Calif. Acad. Sci. Proc. (4) 12:75. ♂.

This species was described from a male taken by E. P. Van-Duzee at Tiburon Island, Gulf of California, Mexico. I have seen material of this rare species from California (Morongo Valley, Palm Springs, Campo) and Nevada (near Arden, Clark County). Timberlake informs me, *in litt.*, that he has a specimen from Jacumba, San Diego County, California. The only floral records for this species are *Croton californica* on which Timberlake found it in Morongo Valley. According to data before me, this species flies from June 6 to August 4.

PENTHEMISIA Moure

Centris subg. *Penthemisia* Moure, 1950. Dusênia 1:390–392. Type: *Centris chilensis* Spinola.

Hemisia subg. *Penthemisia* Michener, 1950. Jour. Kans. Ent. Soc. 24:2–4.

CENTRIS PALLIDA FOX

Centris pallida Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51:66. ♀.

Centris pallida callognatha Cockerell, 1923. Calif. Acad. Sci. Proc. (4) 12:78. ♀ *(new synonym)*.

Centris trichosoma Cockerell, 1923. loc. cit. ♂ *(new synomym)*.

A careful study of a large series of this species and the types of *callognatha* and *trichosoma* has resulted in the above synonomy. The *trichosoma* is identical to males of this species from other parts of its range, while the *callognatha* variation with fulvous hair on the vertex and mesoscutum can be taken along with the typical form in California, Arizona and Mexico.

This species flies during the spring and early summer on the Colorado Desert in California, and visits the flowers of *Cercidium, Olneya* and *Dalea.*

Pallida is a rather peculiar species, and might well belong to the subgenus described above as *Trichocentris*. Occasional males have the hind femora almost half as broad as long. The female has the mandibles tridentate and the maxillary palpi are four segmented. Whether this species falls under *Trichocentris* or *Penthemisia* must await the discovery of the females of *Trichocentris*.

CENTRIS TIBURONENSIS Cockerell

Centris tiburonensis Cockerell, 1923. Calif. Acad. Sci. Proc. (4) 12:78. ♀.

This common species, which occurs in Baja California, California and Nevada, flies in the late spring and early summer along with the superficially similar *pallida*. In Baja California, Mexico, I found this species flying in a light rain and visiting the flowers of *Koeberlinia spinosa*. One female was seen to enter a burrow in loose sand. Like *pallida*, this species also visits *Cercidium, Olneya*, and *Dalea*.

CENTRIS RHODOPUS Cockerell

Centris caesalpiniae var. *rhodopus* Cockerell, 1897. Ann. Mag. Nat. Hist. (6) 19:394. ♀ ♂.

Centris rhodopus var. *pulchrior*, Cockerell, 1900. Canad. Ent. 32:363. ♂.

This is the most common and well-known of our Nearctic species of *Centris* and is found in Texas, New Mexico, Arizona, Nevada, California, Sonora, and Baja California.

CENTRIS ATRIPES Mocsáry

Centris atripes Mocsáry, 1899. Termés. Füzetek 22:254. ♂.

Centris atriventris Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51:68. ♀ ♂. *Preocc.*

Centris foxi Friese, 1900. K. K. Naturhist Hofmus. Ann. 15:350. *New name* for *Centris atriventris* Fox.

The presence of this species in California is marked by the capture of a single male at Brawley, Imperial County, June 21, 1953 by the author, at flowers of *Dalea spinosa*. I have seen material of *atripes* from Baja California, Sonora, Arizona, New Mexico, Texas and Tamaulipas.

CENTRIS LANOSA Cresson

Centris lanosa Cresson, 1872. Amer. Ent. Soc. Trans. 4:284. ♂.

Centris cockerellii Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51:68. *New name* for *Centris hoffmanseggiae* Cockerell, ♀. not the ♂.

Centris cockerelli resoluta Cockerell, 1923. Calif. Acad. Sci. Proc. (4) 12:76. ♀ ♂ *(new synonym)*.

Cockerell erected the variety *resoluta* for the females of this species which have the clypeus reddish in color. My studies, however, reveal that this form also can be found among the so-called typical populations of New Mexico and Texas, while individuals with the clypeus pale yellow may be taken from time to time in Arizona and California.

Centris lanosa is common on the deserts of southern California and is also found in Nevada, Arizona, New Mexico, Texas and northern Mexico. This species flies in the spring and early summer, visiting *Cercidium, Krameria, Dalea* and *Prosopis*.

CENTRIS CALIFORNICA Timberlake

Centris californica Timberlake, 1940. Pan-Pacific Ent. 16:139. ♀.

This rare species, of which the male is unknown, is closely allied to *hoffmanseggiae* Cockerell, but until the male of *californica* is discovered, no definite idea of the true relationship of the two species can be formed.

Centris californica is known from Barstow, San Bernardino County, Kerman, Fresno County, and Turlock, Stanislaus County. This bee has been captured on the flowers of *Cleomella obtusifolia, Wislizenia refracta* and mustard, and capture dates range from July 14 to September 24.

CENTRIS HOFFMANSEGGIAE Cockerell

Centris hoffmanseggiae Cockerell, 1897. Ann. Mag. Nat. Hist. (6) 19:395. ♂ (not ♀).

Centris hoffmanseggiae var. *davidsoni* Cockerell, 1904. South Calif. Acad. Sci. Bul. 3:160. ♂ *(new synonym).*

Cockerell's variety *davidsoni,* described from Banning, California, is much too poorly differentiated to be recognized as a valid form, since individuals of both types may be found together throughout the range of the species, which thus far is known only to include New Mexico and southern California. Although this is primarily a desert species, I have seen a number of specimens taken by C. D. Michener at the Hastings Natural History Reservation, Santa Lucia Mountains, Monterey County. Known floral records for this species include *Cercidium, Lotus, Prosopis, Penstemon, Dicentra* and *Larrea.*

CENTRIS RHODOMELAS Timberlake

Centris rhodomelas Timberlake, 1940. Pan-Pacific Ent. 16:139. ♀ ♂.

This is one of the most distinctive species of *Penthemisia* known to me and does not seem to be closely related to any other species. The strongly protuberant clypeus and dark fox-red pubescence of the thoracic dorsum and the most readily noted characters of this handsome species. It closely resembles *Tetralonia californica* (Cresson) in this respect.

Whereas this species has been found from Ventura County north to Yolo and Fresno Counties, it is apparently absent from the Central Valley. I have seen one male in the collection of the University of California at Davis from Putah Canyon, Yolo and Solano counties, June 2, 1949 (R. C. Bechtel). I am indebted to Dr. G. D. Butler, Jr. of the University of Arizona for allowing me to study four males of this species which he collected at Squaw Valley, Fresno County, June 20, 1953, on the flowers of a thistle. These are the northernmost records for any species of *Centris* known to me and hence are of considerable interest.

A NEW SPECIES OF LEPTOCORIS

(Coreidae: Leptocorini)

HARRY G. BARBER

Entomology Research Branch,
Agricultural Research Service,
United States Department of Agriculture,
Washington, D.C.

Leptocoris rubrolineatus Barber, new species

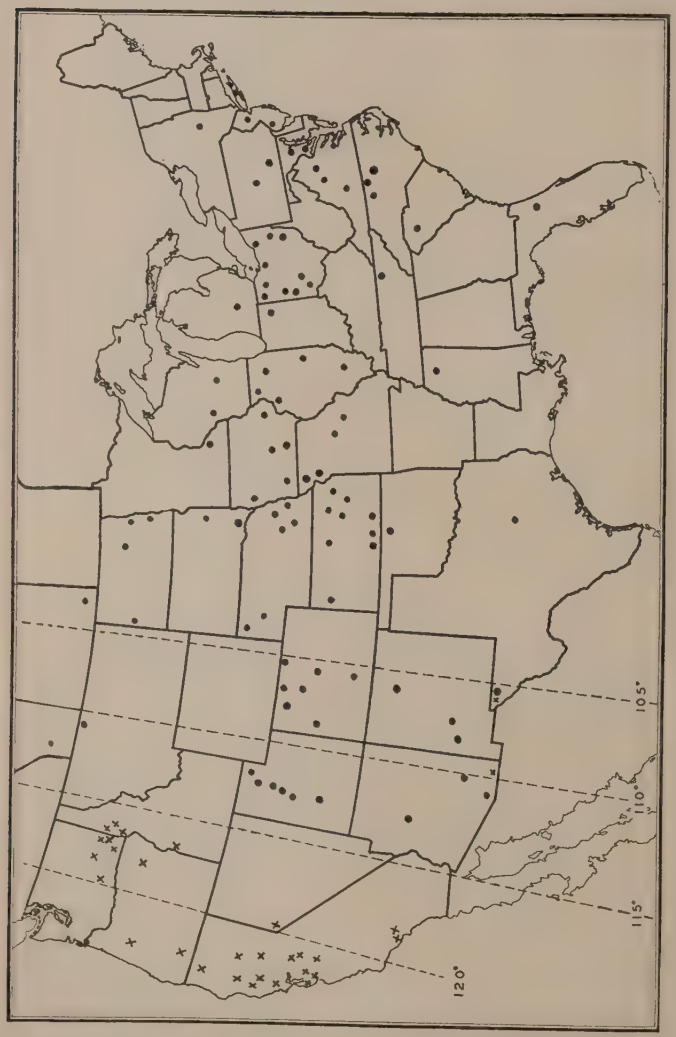
Very closely related to *L. trivittatus* (Say) both in size and general dimensions of body parts, but the coloration is quite distinctive. Pronotum with narrow anterior, posterior and lateral margins, and central line behind the cicatrices, corium with all claval margins, very narrow edge of the costal margin and all veins, red.

Both in *L. trivittatus* and *L. rubrolineatus* the genital segment terminates in four lobes. The lobes on either side of the broad central sinus are more prolonged and parallel sided. The outer lobes are much shorter and subtriangular in shape. Those of *L. rubrolineatus* are shorter and more rounded at apices than in *L. trivittatus* and the sinus within more shallow and more obtusely rounded basally.

Holotype male, HEALDSBURG, CALIFORNIA, July 15, 1931, collected by Mrs. L. P. Enzenauer, U. S. National Museum Cat. No. 62210. Paratypes, males and females, U.S. Nat. Museum: *California*, 13 with the same data as type; 7, Sonoma County; 8, Pasadena; 2, Los Angeles; 1, Livermore; 3, San Gabriel Canyon; 7, Yorkville; 1, Mt. Diablo; 5, Santa Rosa; 8, Middletown; 3, Chico; 1, San Luis Obispo; 2, Sacramento; 2, Courtland; 1, Santa Cruz Mts.; 1, Beaumont; 1, Mint Canyon; 1, Geyser; 1, San Jose; 1, Ft. Tejon; 5, Siskiyou; 1, San Francisco. *Washington:* 3, Ilia; 2, Dayton; 1, Oakesdale; 2, Paha; 1, Pullman; 4, Wapato. *Oregon:* 19, Ashland; 2, Corvallis; 5, Josephine. *Idaho:* 4, Weiser; 1, Lewiston; 1, Juliaetta; 1, Moscow. *Arizona:* 6, Douglas. *Texas:* 2, El Paso. *Nevada:* 1, Reno.

Walker's type of *Lygaeus californicus* in the collection of the British Museum of Natural History is hand labeled, "Santa Cruz, Cal." In March, 1949, Dr. R. L. Usinger examined this type and in correspondence stated that it was *Leptocoris trivittatus* (Say). This was confirmed later by Dr. W. E. China, assistant keeper at

the museum. There is no doubt about this being the same as Say's species as there is contained in the Uhler collection at the United



Distribution of *Leptocoris rubrolineatus* (X) and *L. trivittatus* (•).

States National Museum two specimens of this same series and labeled the same as the Walker type. It is a safe assumption that Walker received his specimen from Professor Uhler.

I am indebted to Dr. Carl J. Drake, now studying at the British Museum, for detailed data attached to the Walker type specimen.

From all of the evidence at hand, the locality record "Santa Cruz, Cal." cannot be accepted. Although there is a Santa Cruz, California, Walker's type could not have come from there. It is quite evidently a case of mis-labeling. In a long series of specimens from various localities in California and the other Pacific Coast States there is no occurrence of Say's species which is distributed practically all over the United States east of the mountains. Since this locality label might refer to Colorado, diligent research revealed that no such locality ever existed in that state.

It therefore becomes necessary to consider this West Coast species as new. A glance at the map shows there is some overlapping in the distribution of the two species in southern Arizona and western Texas, but an examination of the specimens involved shows that there is no intergrading of the two species.

NEARCTIC SPECIES IN THE LIRIOMYZA PUSILLA COMPLEX No. 1 INTRODUCTION

(Diptera: Agromyzidae)[1]

KENNETH E. FRICK[2]

Irrigation Experiment Station, Prosser, Washington

A revision of the species in the genus *Liriomyza* that key to *Agromyza pusilla* in either of Malloch's two keys (1913, 1918), first mentioned by Frick in 1952, is still a long way from completion. However, the urgent need for names for economic species in this group has prompted this series of papers. At present, two California species of economic importance are sufficiently well known to warrant separate descriptions. Their descriptions will form part two of the series.

Frost (1943) made the first attempt to clarify the status of several species in this group. However, the problem of the many very similar species forming a group within the genus *Liriomyza*

[1] Scientific Paper No. 1313, Washington Agricultural Experiment Stations, Pullman, Project No. 1062.

[2] The writer is grateful to M. T. James for reading and evaluating this manuscript.

will have to be attacked much as it was in Europe between 1920 and 1932. In order to separate the Palaearctic species, Hendel, Hering, and de Meijere were required to rear adults, determine larval host plants, study larval and pupal characters, and correlate these with the adults. Their results (Hendel, 1932, 1936), considering only the species synonymized by Malloch (1913) and Frost (1924) under *L. pusilla*, are shown in Table 1.

The species in the genus *Liriomyza* can be separated into several groups. This one, the so-called *pusilla* complex, is composed of a number of very similar species having the following characters in common:

1. Antennae with third segment rounded and bright yellow.
2. Genovertical plates (orbits) not prominently raised above the eyes.
3. Mesonotum without a yellow spot immediately anterior to the scutellum.
4. Mesonotum with two to four rows of acrostichal setae.
5. Femora predominately yellow but sometimes heavily marked with black spots and streaks.
6. Wing with M + M (posterior) crossvein present.

TABLE 1.—Species synonymized by Malloch (1913) and Frost (1924) under *Liriomyza pusilla* and subsequently separated by Hendel (1932, 1936).

Specific Name	Larval Host Plants and Notes
pusilla Meigen, 1830	*Hieracium, Sonchus* spp.
annulipes Meigen, 1830	Not an agromyzid
pumila Meigen, 1830	*Achillea* spp.
strigata Meigen, 1830	Most omnivorous *Liriomyza* sp.
exilis Meigen. 1830	Synonym of *strigata*
orbona Meigen, 1830	Host plant unknown
pusio Meigen, 1830	*Tragopogon* spp.
puella Meigen, 1830	*Lampsana, Prenanthes, Sonchus*, spp.
amoena Meigen, 1830	*Sambucus* spp.
blanda Meigen, 1830	*nomen dubium*
pascuum Meigen, 1838	*Euphorbia* spp.
brassicae Riley, 1844	Many Cruciferae
trifolii Burgess, 1880	Synonym of *congesta* Becker, 1903
	Many Leguminosae

According to this definition several *Liriomyza* species, the names of which have appeared in North American literature, are excluded (Table 2). To date nine species that belong to this group have been reported from North America. These, together with known larval host plants and distributions, are given in Table 3.

TABLE 2.—Names of species that have appeared in North American literature but excluded from the *pusilla* complex as defined in this paper.

Specific Name	Larval Host Plants	Excluding Characters
flaveola Fallén, 1823	Many Gramineae	Mid and hind femora black
scutellata Fallén 1823	.....	Not an agromyzid
orbona Meigen, 1830	Unknown	Infuscated third antennal segment
deceptiva Malloch, 1918	Unknown	Genovertical plates very strongly raised above eye margin
holti Malloch, 1924	Unknown	Angulate third antennal segment
langei, Frick, 1951	Pea, aster, spinach, sugar beet, celery	Infuscated third antennal segment

It is my intent to provide descriptions and comparisons between species so that others may determine the species name of their specimens with a reasonable degree of accuracy. The specific purpose of this introductory paper is to provide figures and descriptions of characters that will be used in future descriptions. I have attempted to use characters that can be seen and measured with a stereoscopic dissecting microscope equipped with 15× oculars. 6× objective, and an ocular net reticule ruled into 0.5 mm. squares.

Liriomyza brassicae (Riley), 1884, is considered a representative species and specimens have been used to illustrate certain characters. Each specimen must be oriented so that the seta being measured for length is perpendicular to the line of vision. The wings also must be perpendicular to the line of vision in order to measure accurately the lengths of certain veins. When setal lengths are used, the longer of a pair has always been chosen over the shorter. For example, if the right-hand inner postalar is twice as long as the corresponding left-hand seta (as frequently occurs), the right-hand seta has been used for measurement.

Head.—Table 3 shows the major characters that subdivide this complex into four distinct segregates. The inner vertical seta usually arises at the edge of the black of the vertex when stated, "Both VT on black" (Fig. 1, C.). When the outer vertical is the

TABLE 3.—Names of species that have appeared in the North American literature included in the *pusilla* complex as defined in this paper, separated by major characters.

Character	Specific Name	North American Larval Host Plants	Known Distribution
Both VT Setae on Yellow (Fig. 1, A)	*pusilla* Meig., 1830, s.s.	*Sonchus* spp. ?	U.S. ?, Europe
	congesta Becker, 1903	*Vicia*, *Trifolium*, and *Medicago* spp.	Throughout U.S., Europe
	allia Frost, 1943	*Allium* spp.	Iowa
	phaseolunata Frost, 1943	Lima bean	New Jersey
VTI on Yellow, VTE on Black (Fig. 1, B)			
Both VT on Black (Fig. 1, C.)	*eupatorii* Kalt, 1874	*Solidago* spp.	Washington, Europe
	verbenicola Hering, 1951	*Verbena* spp.	New Mexico, Utah
Both VT on Black, GVP Infuscated (Fig 1, D)	*virgo* Zett., 1848	Unknown[3]	Kansas ?, Europe
	brassicae Riley, 1884	Many Cruciferae, Nasturtium	Throughout U.S., Europe
	propepusilla Frost, 1954[4]	Unknown	Kansas

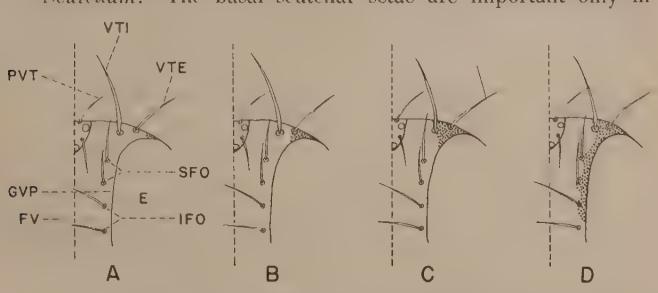
[3] The larvae mine **Equisetum** spp. in Europe.
[4] New name for **subpusilla** Frost, 1943.

only seta on black, it also is usually at the edge of the black (Fig. 1, B). With teneral specimens the black area between the two vertical setae is frequently almost indistinguishable from the yellow. The infuscation of the genovertical plates (Fig. 1, D) is frequently narrower than the space between the frontoorbital setae and the eye margin. In teneral specimens this darkening frequently does not appear, a condition which may lead to confusion in determination. Each specimen should be kept alive for about 24 hours before being killed.

Mesonotum.—The relative lengths of several thoracic setae are of importance in separating species, as are the colors from which

they arise. The presutural (Fig. 2) arises at the edge of the black of the mesonotum. In some species the base touches, or is totally on, the yellow of the lateral margin, or the base is entirely on the black. This is best seen in a cephalic aspect of the specimen. The intraalar is frequently absent, or equal in size to an acrostichal seta. In some species it is twice or more the length of an acrostichal. Fortunately, the intraalar can be distinguished by its location near the posterior end of the intraalar row and its oblique direction pointing it to the fourth (posterior) dorsocentral. The number of setulae in the intraalar row, *i.e.*, between the dorsocentral row and the lateral margin of the mesonotum and posterior to the transverse suture, is of some importance, although much overlapping exists between species. The relative length of the first dorsocentral to the fourth is of more value than the relative length of the second or third to the fourth. The lengths are easily measured from an anterior view of the mesonotum. The relative length of the inner postalar to the outer postalar makes an excellent specific character. These are also measured from an anterior view of the mesonotum. In cases where the wings hide the outer seta, the fourth dorsocentral may be used for measurement. The fourth dorsocentral is slightly longer than the outer postalar, but not enough longer to influence the proportions being measured.

Scutellum.—The basal scutellar setae are important only in

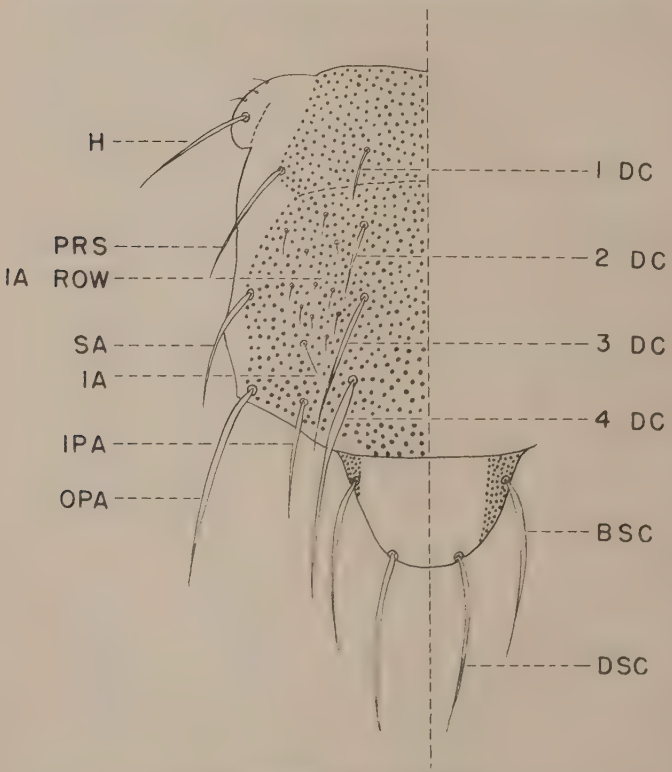


EXPLANATION FOR FIGURE 1

Fig. 1. Portion of the right side of head, anterior view, showing: both VT setae arising from yellow (A); VTI on yellow, VTE on black (B); both VT on black (C); both VT on black, GVP infuscated (D). Areas: E—eye; FV—frontal vitta; GVP—genovertical plate (orbit). Setae: PVT—postvertical; VTI—inner vertical; VTE—outer vertical; SFO—upper frontoorbital; IFO—lower frontoorbital. The orbital setulae, placed between the frontoorbital setae and the eye margin, have been omitted for simplicity.

relation to their bases and the lateral black triangles of the scutellum. The base may be on yellow (not shown), at the edge of the black (shown on left side), or the black may extend centrally well beyond the setal base (right side).

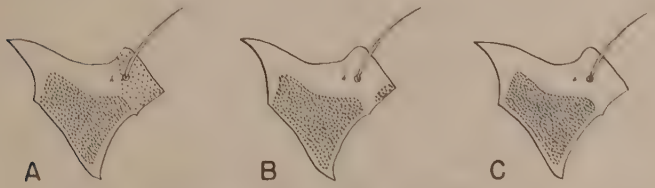
Pleural Area.—The anepisternum (mesopleura) varies from



EXPLANATION FOR FIGURE 2

Fig. 2. Left half of mesonotum and scutellum of *L. brassicae*, right half of scutellum of *Liriomyza* n. sp., showing typical arrangement of setae. The acrostichal setae and the setae of the intraalar row anterior to the transverse suture have been omitted for simplicity. Setae: H—humeral; PRS—presutural; SA—supraalar; IPA—inner postalar; OPA—outer postalar; IA—intraalar; IA ROW—intraalar row; 1 DC—first dorsocentral; 2 DC—second; 3 DC—third; 4 DC—fourth dorsocentral; BSC—basal scutellar; DSC—distal scutellar.

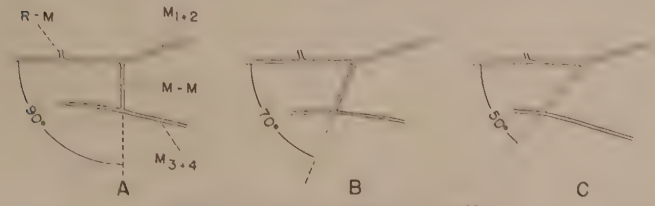
nearly all black to all yellow, depending upon the species. Since the pattern of black on yellow offers a good specific character, illustrations have not been included here. The katepisternum (sternopleura) has three types of posterior markings. The first is broad, covering the entire area caudad of the katepisternal seta (Fig. 3, A). The second consists of a narrow band (B). This band is always darker in the broad type. The third katepisternum has no infuscation posterior to the triangle (C). These markings are useful in species identification, providing the specimens are not teneral.



EXPLANATION FOR FIGURE 3

Fig 3. Katepisternum showing the three types of posterior markings: broad (A); narrow (B); and none (C).

Wing.—Among the more useful characters of the wings are the position and angle of the M + M (posterior) crossvein. This vein may be closer to, equal to, or farther from the R + M crossvein than its own length. The angle that M + M forms with the penultimate section of M_{1+2} (the section of which R + M connects) is important (Fig. 4). The angle may be perpendicular or 90°



EXPLANATION FOR FIGURE 4

Fig. 4. Portion of wing showing three representative angles of crossvein M + M to the penultimate section of M_{1+2}: perpendicular (A); 70°—85° (moderate) angle (B); and 45°—65° (strong) angle (C). Veins: M_{3+4} - fourth longitudinal; M_{3+4} fifth longitudinal; R+M radiomedial or anterior crossvein; M+M medial or posterior crossvein. A and B, wing of *L. brassicae*; *C*, wing of *Liriomyza* n. sp.

(A) moderate, 70° to 85° (B), or strong, 45° to 65° (A). These are arbitrary figures and were chosen as representative of the several angles observed while preparing descriptions.

SUMMARY

A group of very similar appearing *Liriomyza* species, the so-called *pusilla* complex, is defined. All species previously reported in North America are included or excluded on the basis of the definition of the group. Morphological characters of value in subgroup and species determination are described and figured.

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ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED USE OF THE PLENARY POWERS IN CERTAIN CASES FOR THE AVOIDANCE OF CONFUSION AND THE VALIDATION OF CURRENT NOMENCLATORIAL PRACTICE (A.(N.S.)21)

Notice is hereby given that the possible use by the International Commission on Zoological Nomenclature of its Plenary Powers is involved in applications relating to the under-mentioned names included in Parts 1 and 2 of Volume 11 of the *Bulletin of Zoological Nomenclature*, both of which Parts were published 31st January, 1955:

(1) *Applications in Part 2 of Volume 11*

(1) *Neanura* MacGillivray, 1893, and *Hypogastrura* Bourlet, 1839, designation of type species for: *Achorutes* Templeton, 1835, supression of (Class Insecta, Order Collembola) (pp. 38-48) (Z.N.(S.)303).

(2) *Crenophilus*, validation of, as from d'Orchymont, 1942; *aeneus* Germar, 1824, as published in the combination *Hydrophilus aeneus*, validation of (Class Insecta, Order Coleoptera) (pp. 49-55) (Z.N.(S.)752).

(3) *Anurophorus* Nicolet, (1842), designation of type species for (Class Insecta, Order Collembola) (pp. 68-70) (Z.N.(S.)304).

1. Attention is drawn to the proposed adoption of the undermentioned "Declarations":

(a) relating to the transliteration of words normally written in Cyrillic characters (preliminary to insertion in the Code as a Schedule (Copenhagen decision) (pp. 4-18) (Z.N.(S.)310);

(b) defining the status of a generic name published conditionally (pp. 19-20) (Z.N.(S.)833);

(c) clarifying Rule (f) in Article 30 (type species of a nominal genus established as a substitute for a previously established such genus but with a different type species) (pp. 35-37) (Z.N.(S.)867).

2. Any specialist who may desire to comment on any of the foregoing applications is invited to do so in writing to the Secretary to the International Commission (Address: 28 Park Village East, Regent's Park, London, N.W.1, England) as soon as possible. Every such comment should be clearly marked with the Commission's File Number as given in the present Notice.—FRANCIS HEMMING, *Secretary to the International Commission on Zoological Nomenclature.*

JAMES EDWARD COTTLE (1861-1953)

E. R. LEACH
217 Hillside Avenue, Piedmont, California

James Edward Cottle was born in San Francisco, July 10, 1861 and spent his long life there or in the near vicinity, the last twenty odd years in Hayward. He was one of a large family and was a big, strong, active youth who enjoyed athletics, particularly boxing. Speaking of this sport he used to say, rather regretfully, "On Saturday nights we beat each other up for five dollars!" Sometime before 1900 he joined the police force and worked up to Detective Sergeant which position he held when retired in 1927.

In one of his papers he speaks of collecting butterflies in the sand lots of San Francisco as a boy but that was evidently only a prelude to his real interest. This came some years later when he met a collector, thought to be Beverly Letcher, in the field and began to twit him about wasting his time in such a childish pursuit. But before this diatribe was over James Cottle had a complete

change of heart and from that day until he was too old to go into the field some 60 or 70 years later he was an ardent collector himself. Soon after making Letcher's acquaintance he met his "dear old Dr. Herman Behr" and G. T. O. Mueller, "scientists and gentlemen if ever there were such", and Herman Strecker. These gentlemen gave him his first instructions in entomology and identified many of his specimens. At this time he collected also with Beverly Letcher and F. X. Williams. Years later he made trips to many parts of California with Rev. Edward Guedet. By 1906 he had amassed a large collection of Lepidoptera, especially rich in Catocala, only to have it completely destroyed in the great fire following the earthquake of that year. But he was soon collecting again and as enthusiastic as ever. It is related that he carried a small net in his pocket at all times and often netted small moths in the street cars and on the streets at night.

Mr. Cottle travelled up and down the Coast, sometimes alone and at others with a companion, seeking rare butterflies and moths and has left some rather whimsical accounts of these excursions. On a trip to Mt. Hood especially to take *Argynnis Erinna* Edw. he had spent several days searching in vain when "I was coming back to a tree where I had tied the horse and discovered that he had broken the rope and decamped. Quoting unusual paragraphs from the Bible and having visions of paying for a lost horse I trudged down the trail in pursuit . . . Cautiously sneaking up I grabbed his halter . . . and in looking around saw a butterfly. Hurrah! It was a perfect specimen of the rare *erinna*. The old horse had brought me right to the spot which had been the object of my search for six days!"

On another occasion collecting near Point Arena with Rev. Edward Guedet, and looking especially for *Argynnis Behrensi* Edw. just at the moment the latter netted a pair Mr. Cottle thought he heard loud laughter. "Could it have been the voice of old Jim Behrens himself, for whom the butterfly we were hunting had been named? Old Jim Behrens laughing at us from illimitable space?" "Can it be possible that the old fellows, Behr, Rivers, Mueller, those who have tramped the trails we trod, with net in hand, are guiding our footsteps to where long lost specimens may be found?"

Whether or not he was so guided he gathered another large collection, this time limiting it to West Coast species, and when

he passed away on October 20, 1953 at the age of 92 he had collected for the best part of 70 years and was the last survivor of the charter members of the Pacific Coast Entomological Society. It is sometimes said that he was careless about his locality labels and it is undoubtedly true. The post office, or mountain, is occasionally put in the wrong county on his labels and many specimens carried no labels whatever. But the specimens were beautifully mounted, even the smallest perfectly spread, and the collection was a joy to see. Beauty was all important.

At another time he wrote, "In the meantime let us indulge the hope that on the other Shore, wheresoever it be, that Behr, Letcher, Mueller, and in fact all the old collectors who have preceded us across the Great Divide, will have a location picked and nets enough to go around when we shall join them there." May we "indulge the hope" that he has had his wish fulfilled.

For data concerning Mr. Cottle I am indebted to Dr. F. X. Williams and Rev. Edward Guedet.

The Cottle Collection is now in the Chicago Natural History Museum.

A NEW SPECIES OF APLASTUS FROM LOWER CALIFORNIA WITH NOTES ON OTHER SPECIES OF PLASTOCERINAE

(Coleoptera: Elateridae)

ROBERT C. BECHTEL

University of California, Davis

The species of *Aplastus* are inhabitants of the western or southwestern United States, being reliably recorded from Arizona, California, Nevada and Utah. While examining specimens in the collection of the California Academy of Sciences, however, several specimens of a new species from Lower California were found.

Aplastus peninsularis Bechtel, new species

(Figures 9–12)

Male.—Testaceous, thorax slightly darker, head much darker. *Head* coarsely, densely punctured, punctures separated by less than their own diameter; frons with a triangular impression; eye moderately prominent; antenna with apex of segment VII reaching apex of hind angle of prothorax, segment III (fig. 11) 1.3 times as long as segment II, segment IV (fig. 11) 2.3 times as long as segment III and 1.3 times as long as segments II+III, segments IV-X serrate, outer margins almost straight, segment

XI (fig. 10) not serrate, 5.7 times as long as broad. *Prothorax* (fig. 12) measured medially as broad as long; apex evenly arcuate, without median emargination; lateral margin smooth, straight, subparallel, lateral carinula absent; hind angles moderately divergent, strongly carinate above and below; less coarsely, slightly less densely punctured than head, punctures separated by slightly less than their own diameter except on disc and from lateral margin to prosternal suture where punctures are separated by 1.5 to 3 times their own diameter. *Elytron* six times as long as broad; lateral margin straight for basal 2/3, gradually narrowing and evenly arcuate for apical 1/3; striae feebly impressed, gradually disappearing toward humerus, interstrial areas feebly convex. *Prosternum,* excluding mucro, coarsely punctured, punctures separated by slightly more than their own diameter except apical 1/5 which is less coarsely, less densely punctured and separated from basal 4/5 by a transverse carinula, middle 2/5 with a moderate lateral depression on either side of a median elevated ridge, basal 2/5 deeply sulcate between coxae. *Metacoxal plate* rather abruptly and broadly expanded at middle 1/3. *Genitalia* (fig. 9), gonostylus without ventral preapical tooth, as viewed ventrally 2.5 times as long as part of aedeagus projecting beyond its apex; basal part of aedeagus narrow, becoming broader toward middle, middle broadest then gradually narrowing toward apex which is broadly truncate. Length 14 mm., width at humeri 3.25 m.m.

Female.—Unknown.

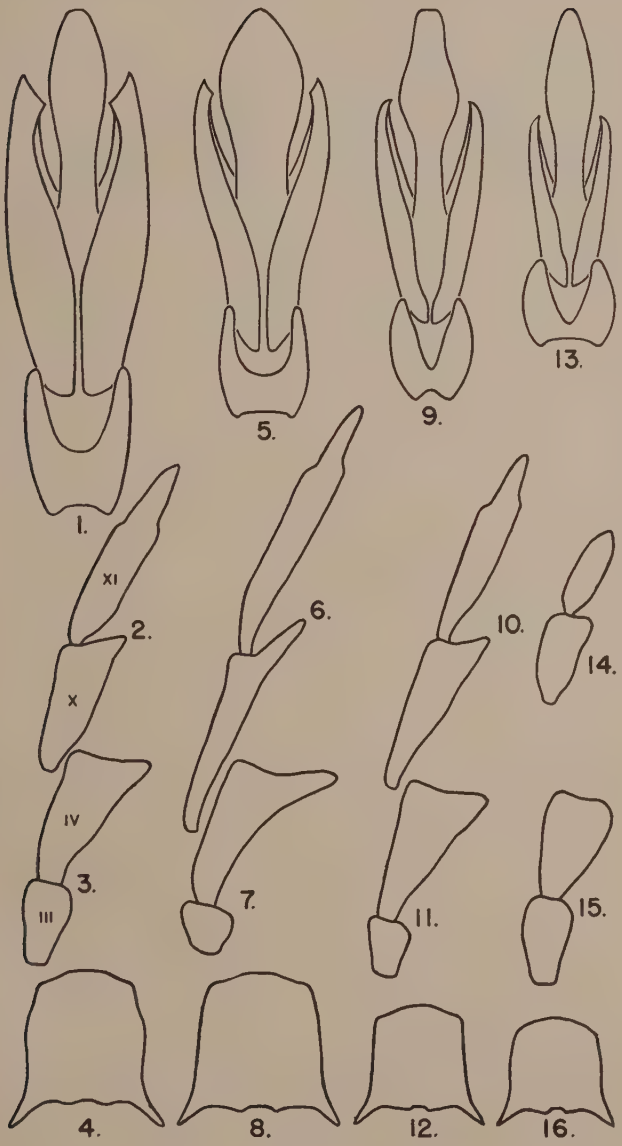
Holotype male, California Academy of Sciences, and 4 male paratypes, San Vicente, Baja California, May 11, 1938 (W. E. Simonds). Paratypes in the collections of the California Academy of Sciences and the writer.

Variations in the type series are as follows: triangular impression of frons present or absent; antennal segment IV 2.1–2.6 times as long as segment III, segment XI 5.5–6.0 times as long as broad; lateral margin of prothorax subparallel or slightly arched near middle, lateral carinula present or absent; apical transverse carinula of prosternum moderate to almost absent; scutellum with or without a median longitudinal carina; length 13.10–14.00 mm., width at humeri 2.75–3.30 mm. with a width:length ratio of 4.2–4.4.

A. peninsularis is closely related to *angusticollis* Horn, *piceus* Van Dyke and *speratus* LeConte. Of these species, it appears to be

EXPLANATION OF FIGURES

Figs. 1–4, *Aplastus speratus* LeConte, Lebec, Kern Co., Calif. Figs. 5–8, *A. piceus* Van Dyke topotype. Figs. 9–12, *A. peninsularis* Bechtel, holotype. Figs. 13–16, *A. angusticollis* Horn, topotype. Figs. 1, 5, 9, 13, male genitalia, ventral, X 36. Figs. 2, 6, 10, 14, antennal segments X–XI, lateral, X 36. Figs. 3, 7, 11, 15, antennal segments III–IV, lateral, X 36. Figs 4, 8, 12, 16, prothorax, dorsal, X 9.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most closely related to *angusticollis* Horn from which it differs in in the shape and size of the antennal segments, prothorax and genitalia (figs. 9-16). It differs from *piceus* Van Dyke and *speratus* LeConte in these same respects (figs. 1-12) but in addition the elytral striae are not well impressed and the ventral preapical tooth of the paramere is absent.

The type localities of two species of Plastocerinae need correction. Van Dyke (1932) stated that the type locality for *Euthysanius cribricollis* Van Dyke is "near Kaweah, Tulare County, California"; the label of the type, however, reads "Kaweah Pwr. Hse. Rsv." Inasmuch as this reservoir is approximately 6 miles ENE of Kaweah and at a higher elevation, it would seem advisable to designate Kaweah Power House #3 Reservoir, ¾ mile S. Ash Mountain Park Headquarters, Tulare County, California as the restricted type locality of *E. cribricollis* Van Dyke. Van Dyke (1943) designated Morongo Valley, Riverside County, California as the type locality for *Aplastus piceus* Van Dyke. Morongo Valley is actually in San Bernardino County, thus the correct type locality of *A. piceus* Van Dyke should be Morongo Valley, San Bernardino County, California.

The above proposed changes in the two type localities were discussed with the late Dr. E. C. Van Dyke who was helpful in determining the exact areas in which the types were collected and who also concurred with the writer concerning these changes.

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BOOK REVIEW

FREAKS AND MARVELS OF INSECT LIFE by Harold Bastin. Printed in Great Britain. Pubished by A. A. Wyn Inc. New York. 248 pp., 20 pl., 25 figs. 1954. $3.75.

Mr. Bastin, who is an Enguish author and a maker of Entomological models, has done a very creditable job in the writing of this book. Not only does it cover a wide diversity of aspects of the vast domain of insect life in a very informative and entertaining manner, but it also escapes triteness by close adherence to the facts, as far as a single reviewer can determine, and by avoidance of teleological statements which are often a major fault of many popular accounts of insect natural history.

In the introductory chapter, a brief description of the major characteristics and general facies of insects as well as a synopsis of the major orders is given and in subsequent chapters, topics considered of greatest interest to persons with little background in entomology are drawn from all phases of the field. As would be expected, major emphasis is given to the structural and behavioristic adaptations of insects to various modes of life; the subjects presented run the gamut from oviposition to insects as they affect man and his economy.

The twenty plates of black and white photographs are excellent for the most part, although a few could have been selected with a little more care. For example, those dealing with insects and pollination (plate XIV) show very little detail and could have been chosen to reveal more of the actual mechanisms of both plants and insects involved in pollen transfer. Some of the insects appearing in various photographs are obviously posed, such as the male of the Hercules beetle transporting its "inamorata" (plate XIX), but the greatest weakness of the work is in the quality of the text figures which, although they convey the idea the author wished to express, appear to some extent hastily done and in several cases are actually rather poor.

A glossary of common names of the insects mentioned in the text and their Latin equivalents is provided as well as an index, but although Mr. Bastin refers by name to many of the authors whose work he has cited throughout the book, no bibliography of any sort has been been included. This is unfortunate since it is obvious that the author is widely read in the various aspects of entomology and could have appended an excellent list of selected references with very little additional work.

Aside from these weaknesses, the book is well worth reading, especially by the interested layman, for the information it contains as well as for the very fine literary style in which the information is presented.—MARIUS S. WASBAUER, *Department of Entomology and Parasitology, University of California, Berkeley.*

TWO NEW BRACONID PARASITES OF THE AVOCADO LOOPER
(Hymenoptera: Braconidae)

C. F. W. MUESEBECK
United States National Museum

Descriptions of the following new species of braconid parasites of the so-called avocado looper. *Sabulodes caberata* Guénée, have been requested in order that names may be available for use in biological papers.

Meteorus tersus Muesebeck, new species

Very similar to *M. dimidiatus* (Cresson), from which it may be distinguished, however, by its clear hyaline wings, by the

absence of a conspicuous pale spot at the base of the stigma, and by its shorter ovipositor.

Female.—Length about 3.5 mm. Face about as long as its narrowest width, faintly transversely aciculate; ocellocular line fully twice as long as diameter of an ocellus; antennae about as long as the body, usually 29- or 30-segmented; mesonotal lobes largely smooth and shining but middle lobe with some minute and faint setigerous punctures; a small, weakly rugulose area at apex of middle lobe; propodeum rugose reticulate, the dorsal face convex and a little longer than posterior face; second abscissa of radius usually twice as long as first; recurrent vein entering extreme base of second cubital cell; nervellus shorter than basal abscissa of basella. Abdominal petiole without dorsal fossae; ventral margins of first tergite widely separated at base of segment, converging and virtually touching at a point midway between base and the spiracles, and then diverging again to posterior margin of segment; petiole smooth, postpetiole finely longitudinally striate; second and following tergites smooth and polished; ovipositor sheath about as long as hind femur, much shorter than hind tibia.

Brownish yellow varied with black or piceous; head brownish yellow with a large blackish spot covering middle of frons and vertex and extending upon occiput; thoracic pleura and sternum usually pale, the dorsum usually blackish but with a brownish-yellow area on mesoscutum behind middle lobe; propodeum blackish, also abdomen except second tergite and the extreme apex which are brownish yellow; wings clear hyaline without a suggestion of discoloration; legs brownish yellow, the middle and hind tibiae and tarsi and apices of hind femora more or less infuscated.

Male.—Essentially like the female but with the antennae usually 31- or 32-segmented and the face slightly wider than long.

Type locality.—CARLSBAD, SAN DIEGO COUNTY, CALIFORNIA.

Type.—U. S. National Museum No. 62560.

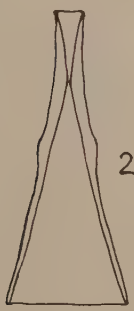
Described from thirteen females and ten males reared from *Sabulodes caberata* (Guénée) August 27, 1954, by C. A. Fleschner. Paratypes are deposited in the California Academy of Sciences.

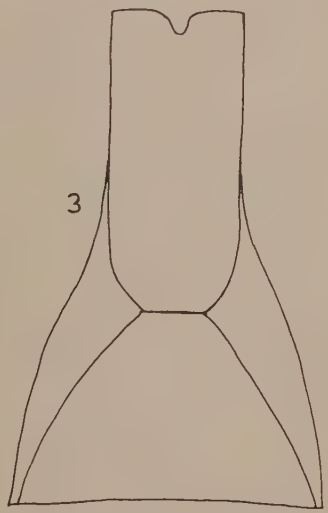
Apanteles caberatae Muesebeck, new species

Runs to *phigaliae* Muesebeck in my key to the North American species (1921, Proc. U. S. Nat. Mus., vol. 58, p. 494) and appears to resemble that species more closely than any other described form. It may be easily distinguished from it, however, by its long second tergite and by being considerably larger. Furthermore, the cocoons of the new species are pure white, unfluted and solitary, whereas in *phigaliae* they are brown, longitudinally fluted and gregarious.

Female.—Length about 3 mm. Antenna fully as long as the body; face at narrowest point slightly broader than long, closely but very shallowly punctate; mesoscutum shining, covered with closely placed, very

shallow punctures; disc of scutellum smooth and shining with only a few scattered, very shallow punctures; propodeum smooth and shining but with a number of short striae radiating from middle of posterior margin; first abscissa of radius perpendicular to anterior margin of wing, a little longer than intercubitus and joining the latter in a distinct though obtuse angle; hind coxa with a large, flattened, punctate area on outer upper edge toward base; inner calcarium of hind tibia longer than outer and distinctly more than half as long as metatarsus. Abdomen rather narrow; first tergite parallel-sided to near apex where it is gradually rounded off, distinctly a little narrower at apex than at base, more than twice as long as broad at apex, smooth and polished on basal two-thirds, finely longitudinally sculptured on apical third; second tergite fully as long as third, with sharply impressed, oblique, lateral grooves setting off a large





EXPLANATION OF FIGURES

Fig. 1, Stigma and second cubital cell of *Meteorus tersus*. Fig. 2, Venter of first abdominal segment of *Meteorus tersus*. Fig. 3, Outline of first and second tergites of *Apanteles caberatae*.

subtriangular median plate that is much longer than broad at base and twice as broad at posterior margin as at base, its surface very weakly, irregularly roughened and shining; following tergites smooth and shining; ovipositor sheath barely surpassing apex of last dorsal abdominal segment.

Black; lateral margins of first and second tergites and basal two-thirds of venter of abdomen brownish; sometimes third tergite a little brownish laterally; tegulae black; wings hyaline, stigma and veins brown;

legs brownish yellow, anterior and middle coxae basally, and hind coxae entirely except sometimes toward apices, black; hind femora and tibiae at apices and the hind tarsi infuscated.

Male.—Like the female in all essential particulars.

Type locality.—CARLSBAD, SAN DIEGO COUNTY, CALIFORNIA.

Type.—U. S. National Museum No. 62561.

Described from five females and nine males reared from *Sabulodes caberata* (Guénée) by J. C. Hall and C. A. Fleschner. Paratypes are in the California Academy of Sciences.

XYLOCOPA RUFINA UTILIZING MEXICAN CEDAR TIMBERS FOR NESTING PURPOSES

(Hymenoptera: Apoidea)

PAUL D. HURD, JR.[1]
University of California, Berkeley

During this past January, while in the state of Chiapas, Mexico, limited observations were made on *Xylocopa rufina* Maidl, one of the poorly known Central American carpenter bees. At Simojovel and the Finca Inapila, near Yajalon, this carpenter bee was actively nesting in sound structural Mexican Cedar, *Cedrela mexicana*. At the former locality, the bee was nesting in some numbers in the ceiling beams of a patio while at the Finca Inapila several burrows were found in vertical door frames. The entrances of the burrows were located on the vertical surface with the burrow always curving inward and upward, usually some six to eight inches. The only previous nesting wood reported for this species was an unidentified pine stump at Uruapan, Michoacan, Mexico.[2]

[1] These observations were made during and as an adjunct to an Associates in Tropical Biogeography, University of California sponsored expedition.

[2] P. D. Hurd, **The Carpenter Bees of California**, Bull. Calif. Insect Survey, 4(2):58.

BOOK REVIEW

MOSQUITOES, THEIR BIONOMICS AND RELATION TO DISEASE. By William R. Horsfall. The Ronald Press Company, New York, 723 pages, 1955. $16.00.

The author of this extensive compilation is to be congratulated for his courage in attempting to review the voluminous literature on mosquito bionomics and relation to disease. An introductory statement to the bibli-

ography states: "Insufficient time and the press of other matters have made a complete coverage of the literature impossible." Unfortunately most critical readers will find rather serious ommissions of pertinent literature.

As a reference work the basic organization of the book is good, providing a consistent form of coverage for genera and species of mosquitoes. An introductory chapter on the subfamily Culicinae discusses in a general way the same categories which are considered later in greater detail under generic and specific headings. All stages in the life cycle are covered, with data on distribution, food habits, assimilation, development, secretion, respiration, parasites, predators, toxinosis, resistance and associated mosquitoes; in addition data on adults include dispersal, swarming, mating, ovulation, oviposition, longevity, latency, excretion, stridulation, reservoir relations and pathogenesis.

The above sections are covered in detail for only those relatively few species which have been extensively studied. There are almost no data given on rearing techniques, although a useful list of references on such techniques is included.

There are many instances where illustrations would clarify the text, but strangely, there is not an illustration in the entire book. Numerous tables are provided including several on parasites of mosquitoes. The latter tables are misleading in that they are incomplete even to ommission of some parasites discussed later in the text under individual consideration of mosquito species.

Perhaps it is inevitable in a book of this size that a certain number of errors occur. However, it is disturbing that incorrect distribution ranges of mosquito species were noted repeatedly, such as that given on page 274 for the range of *Anopheles punctulatus* as "Melanesia north to 20° S lat. and west to 170° E long. . . . ". Citations from the literature are occasionally inaccurate, as on page 293 where Reeves and Rudnick are erroneously attributed with associating endemic malaria on Guam with *Anopheles subpictus indefinitus*.

Readers familiar with the west coast fauna of the United States will be surprised to note that consideration of *Aedes squamiger* is restricted to inclusion in a table of little-known species of *Ochlerotatus*.

An index of genera and species and a very abbreviated general index are provided. The latter is entirely inadequate in a work of this magnitude.

In spite of the above criticisms the book should prove a useful tool to the investigator concerned with mosquitoes.—DEANE P. FURMAN, *Department of Entomology and Parasitology, University of California, Berkeley.*

SOME BARK AND AMBROSIA BEETLES FROM THE TRES MARIA ISLANDS, MEXICO. No. 143. CONTRIBUTION TO THE MORPHOLOGY AND SYSTEMATICS OF THE SCOLYTOIDEA.

(Coleoptera: Scolytoidea)

KARL E. SCHEDL
Lienz, Austria

Mr. Hugh B. Leech of the California Academy of Sciences has sent me again a very interesting collection of bark and ambrosia beetles from various parts of America, amongst them a small batch from the Tres Maria Islands on the west coast of Mexico. As no Scolytidae have been recorded from these small islands so far I thought it worth while to deal with them as soon as possible.

The collection contains two known Scolytidae, two known Platypodidae, a new Scolytid genus, *Xylochilus*, and a new species of the genus *Hylocurus* Eichhoff. The records of the known species are the following:

Problechilus striatus Eggers. Maria Madre Island, Arroyo Hondo, May 17, 1925, ex *Ficus* sp., H. H. Keifer.

Xyleborus volvulus Fabricius. Maria Madre Island, Arroyo Hondo, May 17, 1925 and the same island, village, May 16, 1925, H. H. Keifer.

Platypus konincki Chapuis. Maria Madre Island, May 17, 1925 and Magdalena Island, May 20, 1925, H. H. Keifer.

These specimens are somewhat smaller than the types according to Chapuis (6.25 against 5.0 mm.) but I have in my collection exactly similar specimens from São Paulo in Brazil and probably this difference in size has something to do with the altitude from which the specimens come. *Platypus exaratus* Blandford a very closely related species has been described from Guatemala and I am not quite sure if this species really is different from the Chapuis *Platypus konincki*.

Platypus pulchellus Chapuis. Maria Madre Island, village, May 16, 1925. H. H. Keifer.

The only specimen is also somewhat smaller than my specimens from Costa Rica.

Xylochilus new genus

Body cylindrical and coarsely sculptured as in *Cyrtogenius* Strohmeyer and certain species of *Hexacolus* Eichhoff, but the fore coxae nearly touching each other. Antennae with the funicle four-jointed, the club consisting of three segments separated from each other by interrupted septa as

in the genus *Pityophthorus* Eichhoff. Eyes long oval, feebly emarginate in front, tibia widened distally, tarsi cylindrical.

The new genus shoud be placed in the Crypturgini but its position within this group is rather unique on account of the shape of the antennal club.

Type of the genus: *Xylochilus insularis* Schedl, new species.

Xylochilus insularis Schedl, new species

Reddish brown, 1.9 mm long, 2.4 times as long as wide.

Front plano-convex, densely punctured, pubescence inconspicuous. *Pronotum* somewhat longer than wide (25:23), widest distinctly behind the middle, postero-lateral angles strongly rounded, sides feebly arcuate to subparallel on the basal half, arcuately narrowed in front, the subapical constriction merely indicated, anterior margin broadly rounded and armed with a series of extremely low and subequal asperations; summit short

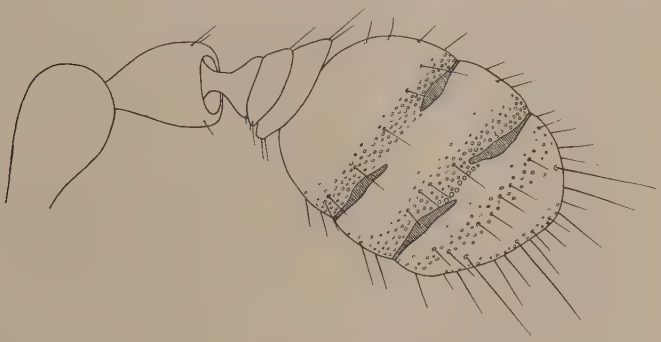


Fig. 1. Antenna of *Xylochilus insularis.*

behind the middle, anterior area obliquely convex, densely and finely asperate, these asperities gradually changing into a granulate-punctate sculpture on the basal area, pubescence extremely short, inconspicuous. Scutellum large, shining, impunctate. *Elytra* as wide and 1.2 times as long as the pronotum, sides parallel on the basal three-fifths, apex broadly rounded when viewed from above, declivity short, steeply convex; disc coarsely striato-punctate, the large punctures closely placed, the interstices very narrow, rather coarsely sculptured, each bearing a row of medium long erect bristles; declivity with the suture feebly elevated, the second interstices feebly impressed, the strial punctures smaller than on the disc, the punctures of the interstices partly replaced by small granules, the pubescence not much different than on the disc.

Holotype, male, MARIA MADRE ISLAND, ARROYO HONDO, May 17, 1925 (H. H. Keifer) in the California Academy of Sciences; *paratypes* from the type locality and Magdalena Island, May 20,

1925 (H. H. Keifer) in the collections of C.A.S. and Schedl.

The female has the front feebly impressed below, the punctuation much finer, the pubescence longer and more conspicuous, the pronotum more gradually narrowed from the base to the apex and the punctuation of the elytral declivity distinctly coarser.

Hylocurus tresmariae Schedl, new species

Female.—Reddish brown when mature, 1.34 to 1.46 mm. long, 2.5 times as long as wide. One of the smallest species of the genus as far as Central America is concerned, with long and fine pubescence on the underside. *Front* broadly convex, impressed on a rather small area below, impression shining, polished, with a few punctures toward the outer margins, the convex portion silky opaque, minutely scratched, finely punctured. Antennal scape clubshaped, with rather long fine hairs. *Pronotum* about as long as wide, postero-lateral angles rectangular, feebly rounded, sides parallel on the basal two fifths, strongly and obliquely narrowed in front, subapical constriction hardly noticeable, anterior margin rather narrowly rounded; summit high, in the middle, anterior area obliquely convex, finely and not very densely asperate, finely granulate-punctate, pubescence inconspicuous, scale-like large, shining, impunctate. *Elytra* feebly wider and 1.5 times as long as the pronotum, of the usual shape, cylindrical to well behind the middle, apex strongly acuminate, declivity short and steeply convex; disc with rows of medium sized but deep punctures in hardly impressed lines, interstices rather narrow, each with a row of minute hardly visible punctures which bear fine slender and erect scalelike hairs; declivity with the interstitial bristles becoming distinctly spatulate, the striae impressed, the strial punctures much more closely placed, the interstices narrowly elevated and the inter-spacial punctures replaced by regularly arranged granules.

Male.—Rather similar to the female but distinctly stouter, the front more widely and feebly concave and the hairs of the antennal scape more numerous and longer.

Holotype, female, TRES MARIA ISLANDS, MARIA MADRE, VILLAGE, May 15, 1925 (H. H. Keifer) in the California Academy of Sciences, *paratypes* in the collections of C.A.S. and Schedl.

FAUNA AETHIOPICA VIII. 144. CONTRIBUTION TO THE MORPHOLOGY AND SYSTEMATICS OF THE SCOLYTOIDEA

(Coleoptera: Scolytoidea)

KARL E. SCHEDL
Lienz, Austria

Mr. Borys Malkin has collected some Scolytidae and Platypodidae in Angola, in the British Cameroons and in Nigeria

during 1948 and 1949. This material has been sent to me by Mr. Hugh B. Leech of the California Academy of Sciences for identification. Besides a good number of known species, the records of which I shall give elsewhere, there have been presented some new species. The descriptions are given below.

Xyleborus bostrichoides Schedl. new species

Female.—Dark reddish brown, 2.4 mm. long, 2.25 times as long as wide. *Xyleborus bostrichoides* has to be placed in the Xyleborus scabrati and is easily distinguished from related species by the type of sculpture on the elytra. *Front* subopaque, plano-convex, densely granulate-punctate, with a few scattered hairs on the frontal face and along the epistomal margin. *Pronotum:* as wide as long, widest at the base, postero-lateral angles but feebly rounded, the sides subparallel, feebly constricted in the basal half, broadly round in front, apical margin with some very low asperities; summit high, in the middle, anterior area steeply convex, densely asperate, the asperities gradually changing over into a granulate-punctate sculpture on the basal area, pubescence fine and sparse. Scutellum: rather large, wider than long, shining, polished and impunctate. *Elytra* feebly wider and 1.66 times as long as the pronotum, widest at the beginning of the declivity, sides fairly straight in the basal three fifths, apex very broadly rounded, declivity beginning short behind the middle, obliquely convex; disc striate-punctate, the striae shallow except the first one on each side, the strial punctures moderate in size, rather closely and regularly placed, the interstices fairly wide, each one with a regular row of somewhat smaller punctures, those of the first two interstices more irregular in arrangement, all interstitial punctures bearing very fine erect hairs; declivity with the second interstices feebly impressed, the suture and the third interstices each with a short row of remotely placed but distinct granules additionally to some punctures, the striae distinct, the strial punctures as large as on the disc, the second interstice rather confusely and coarsely punctured, the apical margin acute and indistinctly crenulate up to the seventh interstices, the pubescence somewhat longer than on the disc.

Holotype and 15 paratypes from ANGOLA: MALANGE, 11-IX-1949, ex *Cassia siamea* Lam. (Caesalpiniaceae), B. Malkin collector. (Holotype deposited in California Academy of Sciences.)

Xyleborus diglyptus Schedl. new species

Female.—Reddish brown, 2.5 mm. long, 2.8 times as long as wide. This new species is rather difficult to place as I do not know any related form but it seems to be advisable to include it into the Xyleburi angustati at the present time. *Front:* opaque, minutely punctulate, finely but rather remotely punctured, with a fringe of yellow hairs along the anterior margin only. *Pronotum:* feebly longer than wide (29:26), widest in the middle, postero-lateral angles rounded, feebly diverging in the basal fifth,

thence parallel to little beyond the middle, apex broadly rounded, apical margin with numerous small asperities, summit distinctly before the middle, anterior area convex and very densely covered by small asperities, basal area subshining, very finely punctured, pubescence fine and erect, more dense at the sides. Scutellum moderate in size, as long as wide, shining. *Elytra* as wide and 1.5 times as long as the pronotum, the sides parallel up to the middle, thence feebly and gradually incurved, the apex rather narrowly rounded, declivity commencing short behind the middle, obliquely convex; disc with rows of very fine but rather distinct punctures, the two sets, those of the principal rows and the others of the interstices difficult to distinguish, the strial punctures bearing minute and inclined hairs, those of the intervalles being much longer and semierect, some of the interstitial punctures replaced by fine granules towards the declivity, declivital face with the striae distinctly impressed, the strial punctures larger than on the disc, each interstice with a series of setose granules, the apical margin up to the seventh interstices not acute but marked by a set of fine toothlike granules, the last ones near the suture situated in continuation of the first interstices a little larger than the others, pubescence more conspicuous on the declivity than on the disc.

Holotype, BRITISH CAMEROONS, MT. CAMEROON, BUEA SLOPE, 4500 ft., 13-V-1949 (B. Malkin), in the California Academy of Sciences; paratypes collection Schedl.

Doliopygus malkini Schedl, new species

Male.—Reddish brown, 3.0 mm. long, 3.5 times as long as wide. More closely allied to *Doliopygus uncinatus* Schedl but smaller, with the median emargination of the second abdominal sternite more triangular in shape, the lateral processes shorter and stouter. *Front* flat, separated from the vertex by a subacute angle, frontal face subopaque, minutely punctulate, additionally with some shallow punctures, those more distinct and larger in the upper third, very fine along the more shining epistomal margin, median strigae impressed. *Pronotum* longer than wide (28:24), lateral emarginations shallow, surface brightly shining, very finely punctate, a few larger punctures along the apical margin. *Elytra* feebly wider and 1.7 times as long as the pronotum, of the usual general form, sides straight, all alternate interstices terminating into triangular toothlike processes, the first interstice distinctly shorter than the third, the outer ones gradually decreasing in length, the disc with regular rows of fine shallow punctures, the first row only somewhat impressed, the scattered minute punctures of the interstices hardly noticeable; abdomen with the second sternite triangularly and widely emarginate medially, the lateral processes rather high but not long, subperpendicular when viewed from the side, face of the second sternite shining, with a few setose punctures along the sides and some coarser ones around the median emargination, sternites three to five strongly shining, impunctate, the fifth with a shallow depression on each side.

Holotype and 3 paratypes from NIGERIA, OGBOMOSHO, 9-XII-

1949 (B. Malkin); in the California Academy of Sciences; other paratypes are from Kabba, 20-II-49 (B. Malkin).

Doliopygus ugandae Schedl, new species

Male.—Reddish brown, elytra in the greater part pale yellow, 4.2 mm. long, 3.1 times as long as wide. The two specimens of my collection bear the label *Crossotarsus hardenbergi* Samps. and have been determined by Sampson himself. The species *Crossotarsus hardenbergi* Samps. is not valid any more and moreover these two specimens are quite different from all the other allies and easily distinguished by the characters of the 2nd abdominal sternite. *Front* aplanate, densely punctured, medially with a subimpressed strigae, separated from the vertex by an acute angle, pubescence short and erect. *Pronotum* distinctly longer than wide (45:38), femoral emarginations shallow, surface shining, rather densely, uniformly and finely punctured, median sulcus long, some short hairs on the sides only. *Elytra* of the usual shape as common in the Doliopygi conjuncti, feebly wider and 1.7 times as long as the pronotum, regularly striate-punctate, the punctures largely submerged, the striae shallow, the interstices fairly wide, with some minute hardly visible punctures, apex of elytra as in Doliopygus ghesquièri Schedl; abdomen with the second sternit broadly emarginate in the middle, the lateral processes strongly thickened at the upper limit producing an edgelike ridge opposite the upper nearly horizontal margin of the processes, fifth sternite concave, without a toothlike structure.

Holotype male, UGANDA: KAMPALA, MULANGE MABIRA FOREST, 4000 ft., in the Schedl collection.

RECENT LITERATURE

THE BLOWFLIES OF CALIFORNIA (Diptera: Calliphoridae). By Maurice T. James. Bull. Calif. Insect Survey, Vol. 4, No. 1, pp. 1–34, incl. 2 pls., 1 text fig. Offset printed. University of California Press, Berkeley and Los Angeles; October 28, 1955. Price 50 cents.

Identification keys are given for the subfamilies, genera, and species of Californian calliphorids (adults), with label data in full; larval habits are summarized. The seven figures on two plates show structural details.

THE CARPENTER BEES OF CALIFORNIA (Hymenoptera: Apoidea). By Paul D. Hurd, Jr. Bull. Calif. Insect Survey, Vol. 4, No. 2, pp. 35–72, incl. 6 pls., 4 maps. Offset printed. University of California Press, Berekeley and Los Angeles; October 28, 1955. Price 50 cents.

This paper is of broader coverage than the title suggests, for the keys and distributional maps are presented for the known species of America north of Mexico. Californian records are given in detail; nesting habits are discussed.—HUGH B. LEECH, *California Academy of Sciences.*

A KEY TO THE WORKERS OF VEROMESSOR FOREL OF THE UNITED STATES AND THE DESCRIPTION OF A NEW SUBSPECIES

(Hymenoptera, Formicidae)

MARION R. SMITH

Entomology Research Branch, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.

For many years only five species of *Veromessor* were known to occur in the United States, these being *andrei* (Mayr), *chamberlini* (Wheeler), *lobognathus* (Andrews), *pergandei* (Mayr), and *stoddardi* (Emery). In 1951 (Great Basin Nat. 11:94–96) I added a sixth, *lariversi*, from a locality 5 miles west of Pyramid Lake (Washoe County), Nevada. Recently a seventh form, a new subspecies of *stoddardi* was received from Chico (Butte County), California. This is described below. As two *Veromessor* new to science have been found since the appearance of Creighton's Ants of North America (1950. Harvard Univ., Mus. Comp. Zöol. Bul. 104:94–96), a key for the identification of the workers of all our forms is offered here.

Genus VEROMESSOR Forel

(Key for identification of workers of the forms occurring in the United States)

1. Base of antennal scape dilated to form a prominent, trumpet-shaped structure. (Epinotal spines long, much longer than the distance separating their bases. Thorax very coarsely sculptured, rugulose-reticulate. Color highly variable: commonly reddish brown to blackish.) One of the most common species. Ariz., Calif., Nev., Oreg., and Mex. ..... andrei (Mayr)

   Base of antennal scape not shaped as described above 2

2. Epinotal spines short, not longer than the distance separating their bases 3

   Epinotal spines long, much longer than the distance separating their bases 6

3. Pronotum longitudinally rugulose. Ammochetae lacking. Color largely reddish brown 4

   Pronotum not longitudinally rugulose. Ammochetae well developed. Color not as described 5

4. Base of antennal scape flattened and also noticeably dilated. Dorsal surface of head although possessing coarse punctures in addition to the other sculpture, the punctures are not readily discernible. Calif. (Butte County) ..... *stoddardi chicoensis* M. R. Smith new subspecies

   Base of antennal scape not as described above. Dorsal surface of head with coarse scattered punctures in addition to the other sculpture, the

punctures very conspicuous. Calif. (Monterey County and southward), Mex. ..... *stoddardi stoddardi* (Emery)

5. Color black or picous brown. Eye not remarkably large and convex but with a rather distinct anteroventral angle. Middle of the anterior border of the clypeus with a projection. Pronotum smooth and shining but with a distinct shagreening. One of the most common species. Ariz., Calif., Nev., Mex..... *pergandei* (Mayr)

Color not as described above but of a very light brown that reminds one very much of a callow. Eye remarkably large and convex but lacking the anteroventral angle. Middle of the anterior border of the clypeus without a projection. Calif., Nev..... *lariversi* M. R. Smith

6. Base of antennal scape unusually enlarged or dilated. Scape smooth and shining. Median rugulae of the head noticeably diverging posteriorly. Calif. (Santa Cruz Island and mainland areas near Los Angeles) ..... *chamberlini* Wheeler

Base of antennal scape not unusually enlarged or dilated. Scape not smooth and shining. Median rugulae of the head not noticeably diverging posteriorly. Bearing a superficial resemblance to *Pogonomyrmex occidentalis* (Cress). Colo. (Glenwood Springs and Owl Canyon, 20 miles north of Fort Collins)..... *lobognathus* (Andrews)

Veromessor stoddardi chicoensis M. R. Smith, new subspecies

Worker. Length 6.2 mm.

Head subrectangular, scarcely longer than broad, with rounded posterior corners and distinctly concave posterior border. Cheeks noticeably converging toward the mandibles. Eye placed nearer the anterior than the posterior border of the head, moderately convex, approximately 0.3 mm. at its greatest width. Mandible rather large, subtriangular, with 7 rather blunt teeth. Base of scape curved, flattened and also noticeably broadened; gradually and distinctly enlarged toward the apex, the apex of the scape not attaining the posterior border of the head; last four funicular segments enlarged but not forming a pronounced club. Frontal carina short, posteriorly divergent, not concealing the insertion of the antenna. Frontal area subtriangular, impressed. Middle of the anterior border of the clypeus with an impression or emargination. In profile, promesonotum forming a moderate arch which terminates at the pronounced mesoepinotal constriction which is approximately 0.10 mm. deep and at least twice as long. Base of epinotum lower than the promesonotum and sloping posteriorly to the epinotal spines which are short, even shorter than the distance between their bases. From above, pronotal humeri rounded; promesonotal suture present but not well defined. Legs rather long and slender, with the femora and tibiae only moderately incrassated. In profile, petiole rather small with erect node the anterior surface of which meets the pedicel in a distinct angle; ventral surface of petiole with a poorly defined longitudinal carina. From above, the postpetiole is subpyriform. Gaster oval, without humeri.

Head with finely punctate interspaces between the fairly coarse longitudinal rugulae; also scattered over the head there are some rather

coarse punctures which are best seen only in certain lights. Promesonotum largely longitudinally rugulose, the interspaces finely punctate. Dorsal surface of epinotum transversely rugulose. Side of thorax longitudinally rugulose; the interspaces on the mesopleuron and side of epinotum coarsely punctate thus causing these areas to appear dull or subopaque.

Petiole and postpetiole finely punctate with the dorsal surfaces bearing a few coarse, foveolate impressions. Gaster with a fine shagreening which is not always readily seen.

Body with a moderate amount of erect, coarse, golden hairs of variable length, some of the hairs being rather long. Gula without ammochetae.

Head and thorax a rich reddish brown, gaster blackish except at the base; petiole, postpetiole and legs with infuscated areas.

Type locality: CHICO. BUTTE COUNTY. CALIFORNIA. March 2, 1954, Adrian Wenner.

The workers of this new form were collected in Sec. 17, T22 N, R2E in the Chico area lava flow plateau at an elevation of 450 feet. This is approximately where the foothills of the Sierra Nevada meet the Sacramento Valley at the upper end of the Chico creek alluvial fan. The nest was beneath about a twenty pound stone. It was composed of a series of galleries that led approximately 12 inches into the soil. In summer the soil is baked dry and at this time the ants very probably aestivate.

Described from a holotype and 20 paratype workers which have been placed in the United States National Museum under U.S.N.M. No. 62959.

This polymorphic subspecies varies considerably not only in size but also in color and body proportions. Paratypes show the following variations. the smallest worker is 3.7 mm., the largest 6.7 mm., infuscated areas of variable size and intensity commonly occur on the head. petiole, postpetiole and legs, smaller workers have a longer and narrower head than the larger workers.

Creighton (1953. Amer. Mus. Novitates No. 1612. pp. 17–18) has shown that the typical *stoddardi* is a true harvesting ant with foraging activities very probably of a crepuscular nature. It is quite likely that this new subspecies may have similar habits. Individuals who are especially interested in the taxonomy, biology and distribution of the various forms of *Veromessor*, as well as those of *Novomessor*, are referred to the paper entitled. "A Study of the Ant Genera Novomessor and Veromessor" by Wheeler and Creighton 1934. Proc. Amer. Acad. Arts and Sci. 69:341–387, 2 pls.

AN UNUSUAL NEW TABANUS FROM ARIZONA

(Diptera: Tabanidae)

L. L. PECHUMAN
Lockport, New York

In 1953, Professor Henry Dietrich of Cornell University and Mrs. Dietrich collected long series of Tabanidae in Arizona. This material has contributed considerably to our knowledge of the Tabanid fauna of Arizona and comments on some of the species collected will be published separately.

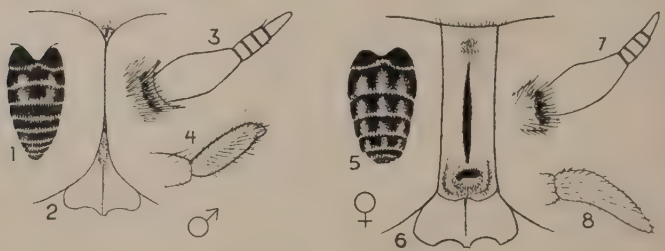
Among the material collected in 1953, is a series of an apparently new species of *Tabanus*. It is a pleasure to dedicate this species to Professor Dietrich whose collecting activities for many years have added much to the study of North American Tabanidae.

Tabanus dietrichi Pechuman, new species

Female. Length 16 mm. Eye pilose, hair very short; ground color of eye dark green with a single diagonal purple band; short, stiff, golden yellow occipital hairs rimming eyes. Frons slightly over three times as high as greatest width, essentially parallelsided but slightly wider below, dull ochre yellow pollinose with numerous stiff semierect black hairs; basal callus small and almost obliterated by pollen of frons and what portion can be seen is finely wrinkled; median callus narrow, somewhat spindle shaped, not quite touching basal callus; subcallus concolorous with frons, slightly protuberant; ocellar tubercle absent but a thinning of the pollen in the ocellar area allows a portion of the integument to be seen in vicinity of two vestigial lateral ocelli. Antennae black, first segment slightly enlarged above; third antennal segment slightly angulate above but with no dorsal excision; annulate portion somewhat shorter than basal portion of third segment; a few long black hairs on some of the annuli. Frontoclypeus and cheeks concolorous with frons and subcallus and with no bare areas; many black hairs on upper portion of cheeks and frontoclypeus but beard bright yellow. Palpi yellow with a pinkish cast, not greatly thickened at base and with many stiff black hairs and a few fine yellow hairs. Proboscis short, only slightly longer than palpi. *Mesonotum*: black with five indistinct pale stripes which are covered with recumbent orange-gold hairs, the area between the stripes being covered mostly with black hairs; prescutal lobe dark yellowish brown. Scutellum black with golden hairs. Pleurae black with black hairs and several patches of pale yellow hairs and a tuft of bright orange hairs on the mesopleuron just below base of wing and bright yellow hairs on the postalar callosity. Legs black with mostly black hairs; basal third of fore and middle tibiae and basal sixth of hind tibiae brownish yellow; middle femora with a few and hind femora with many golden yellow hairs in addition to black hairs; hind tibial fringe black although there are a few yellow hairs on the hind tibiae; underside of middle and hind tarsi with many short reddish yellow hairs. Wings with a faint dusky

tint which is most intense in the costal cell; all veins faintly bordered by heavier infuscation and dark spots are present on the crossveins and at the bifurcation of the third longitudinal vein; veination normal without a spur at the bifurcation of the third longitudinal vein. Knob of halteres dark brown, cream colored at apex; stem pale brown. *Abdomen* a peculiar shade of yellowish gray with a faint greenish tinge with darker markings which consist on the second to fifth segments of paired dashes which do not quite reach the posterior border but unite anteriorly to form a black border which reaches across the segment and expands to form a large dark spot at the anterio-lateral margin of the tergite; first tergite mostly dark with infuscation heaviest under the scutellum; sixth tergite black; all segments with bright golden yellow hairs over paler portions and black hairs over dark portions; posterior margins of all tergites fringed with golden yellow hairs. Venter fuscous, second to sixth sternites with very narrow pale posterior borders and fringes of golden hairs; center of fourth and most of fifth and sixth sternites with black hairs; balance of venter densely covered with yellow hairs.

Male. Length 15.5 mm. Much darker than female. Eyes pilose, facets about same size throughout; fringe of hairs on occiput golden yellow Occipital tubercle with a crease through the center, yellowish brown pollinose with yellow hairs. Frontal triangle considerably wrinkled, dark yellow pollinose, darker above. Frontoclypeus and cheeks concolorous with frontal triangle but cheeks becoming brighter yellow below; cheeks slightly protuberant, with long black hairs. Antennae black, shaped much as in female, with a few long black hairs on some of the annuli. Palpi yellowish brown about two and a half times as long as greatest thickness, decurved at tip, with many black and a few yellow hairs. *Mesonotum* black with black hairs and a very few yellow hairs and only the faintest indication of pale stripes; prescutal lobe chestnut colored; scutellum concolorous with rest of thorax, black haired with a fringe of yellow hairs posteriorly. Pleurae black, mostly black haired. Legs black and black haired, fore and middle tibiae somewhat yellowish at base, middle and hind tarsi with



EXPLANATION OF FIGURES

Tabanus dietrichi Pechuman.—Male: 1, abdomen; 2, frontal triangle; 3, third segment of antenna; 4, second segment of palpus. Female: 5, abdomen; 6, frons; 7, third segment of antenna; 8, second segment of palpus.

stiff reddish hairs beneath. Wings as in female. Halteres dark brown. *Abdomen* mostly black and black haired; second to sixth tergites with very narrow pale posterior bands and a fringe of yellow hair; first tergite with traces of a very small sublateral chestnut colored spot resting on the posterior border; second and third tergites with larger chestnut spots which practically cross segment. Venter mostly black and black haired with narrow pale posterior borders with a fringe of yellow hair on the second to sixth sternites; the third sternite with a large chestnut spot on each side near the median line which crosses the segment and extends slightly over the second sternite.

Holotype, female: PHELPS BOTANICAL AREA, WHITE MOUNTAINS, ARIZONA, 8 July, 1953 (A and H. Dietrich), in Cornell University collection. *Allotype*, male: same data as holotype, in Cornell University collection. *Paratypes:* 3 females with same data as holotype; 1 female same locality as holotype collected 7 July, 1953; 34 males same data as holotype; 16 males same locality as holotype collected 7 July, 1953. With the concurrence of Professor Dietrich, paratypes are to be distributed as follows: 1 male and 1 female to the United States National Museum, University of Arizona, Tucson, Dr. Cornelius B. Philip and the writer. Additional male paratypes are in the collection of Cornell University and the writer.

In the series studied the females showed little variation from the holotype; the amount of black and yellow hairs on the legs and palpi was not always proportionately the same as in the type and the series varied from 14 to 16 mm. in length. In the males, variation was mostly in the color of the abdomen; in some specimens the chestnut colored spots were more extensive than in the allotype, in others less extensive and in some specimens these spots were absent leaving the abdomen completely black with very narrow pale posterior borders on the tergites; in a few specimens there are traces of a pale mid-dorsal triangle on the second tergite. The males varied in length from 14 to 16.5 mm. Two specimens were not included in the series of paratypes since they appear to be monstrosities; they have holoptic eyes as in the male with an abdominal pattern much like that of the female and the palpi are obviously aberrant.

Tabanus dietrichi is unique in several respects. It may be separated from all *Tabanus* known to the writer by the almost completely pollinose basal callus. Its peculiar coloration is approached in the Tabanidae to the writer's knowledge only by

Chrysops hirsuticallus Philip and occasional specimens of *Atylotus incisuralis* (Macquart).

Generic placement of this species was difficult. Its affinities seem to be with a group of species which includes *Tabanus gilanus* Townsend, *T. boharti* Philip, *T. fairchildi* Stone, *T. reinwardtü* Wiedemann, and *T. stonei* Philip but certain characters relate it to *Atylotus* on one hand and *Hybomitra* on the other. Although none of the above species are congeneric with the genotype *Tabanus bovinus* Linnaeus in a strict sense, our present knowledge of the group would scarcely justify generic separation.

The conditions under which *Tabanus dietrichi* was found are of interest. As described by Professor Dietrich, the males were collected in knee high grass growing in a wet meadow at an elevation of about 9,500 ft. It is to the great credit of Professor Dietrich that he recognized that the abundant females of *Tabanus* present at that time belonged to other species. Persistent search for comparable females resulted in the collection of five specimens which were resting on the outer walls of a cabin at the edge of a wet meadow where the males were collected.

I am indebted to Mr. William Wild of the Buffalo Museum of Science for the figures of *Tabanus dietrichi*.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

H. B. LEECH, *Vice-President* | W. C. DAY, *President* | D. D. JENSEN, *Secretary*

PROCEEDINGS

Two Hundred and Fortieth Meeting

The two hundred and fortieth meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on Friday, February 4, 1955, in the Morrison Auditorium of the California Academy of Sciences, San Francisco. President W. C. Day conducted the meeting. The following members were present: R. L. Usinger, W. C. Day, H. B. Leech, P. D. Hurd, Jr., Charles Hildebrand, Glen M. Cagley, Borys Malkin, Berta B. Kessel, Edward L. Kessel, L. R. Gillogly, Hilary Hacker, W. Anthony Doalin, W. W. Sampson, Stephen Hitchcock, Otto W. Graf, Jr., and J. W. Tilden. The following visitors were present: Grace Hurd, James Gillogly, Alan Gillogly, Robert L. Hacker, and Duncan Cuyler.

The minutes of the annual meeting held December 4, 1954, were read and approved.

Carlo Gemignani was elected to full membership in the Society.

President Day, reporting for the program committee, announced that J. K. Holloway is scheduled to speak at the March 5th meeting, and E. S. Ross will be the speaker on April 16th, if he has returned from South America by that time.

Dr. Usinger announced the second memoir of the Society, "Revision of the Spider Mite Family Tetranychidae" by A. Earl Pitchard and Edward W. Baker, will be out in about six weeks.

President Day appointed the following committee to select a site for the field trip scheduled for May 21, 1955: Dr. Paul D. Hurd, Jr., chairman, Dr. Gordon Edwards, and Dr. E. L. Kessel.

In response to the President's call for notes and exhibits, Dr. J. W. Tilden showed two photographs of a teratalogical scorpion, in which one of the book lungs had developed into a malformed pectine. This might offer some support to the theory that book lungs and pectines are serially homologous.

Borys Malkin reported on *Machlotes* spp. (Colydiidae) from New Guinea, the Philippines, and Hainan Island. He exhibited fifteen specimens belonging to the Academy and reported that there are five specimens in the British Museum.

Dr. Kessell reported that Dr. Ross has sent from Peru, to date, 80 boxes of color slides and over 180,000 specimens. His trip has been extended until April.

It was announced that Tom Briggs, a member of the Society and senior at Lincoln High School in San Francisco, has been selected for his work on Solpugids as one of two outstanding science students west of the Mississippi River.

Dr. Usinger proposed that Dr. Kessel be delegated to write a letter to Tom Briggs commending him in the name of the Society for his

selection as outstanding science student. The motion was seconded and passed unanimously.

Dr. Usinger commented upon several species and two genera of myrmecomorphic Mirid bugs. These were exhibited, along with the ants which they mimic. In his study of the genus *Dacerla* he discovered that three species, including one collected in Mexico by Mr. Leech, belong to a new genus which he is describing. Most of these species are brachypterous but one from southern California has fully developed wing-covers and wings.

In the absence of Miss Emily Bartholomew, Mr. Leech read her note on the habits of a California specimen of the southern European Katydid, *Phanoptera quadripunctata* Brunner. (See Strohecker, 1952. Pan-Pac. Ent. 28(3):138). "On August 8, 1953, a small katydid was taken in a quince tree near Sunnyvale, California. It was kept in a cage for about a month before it died. It stridulated occasionally, most often at night. Its song was a series of irregularly repeated, rasping clicks, with a soft, lisping, leisurely quality. The katydid flew readily and in the manner of a *Scudderia*. Its general behavior was no different from that of the *Scudderia* which were in the same cage. Mr. J. A. G. Rehn, Philadephia Academy of Sciences, identified the specimen."

Dr. Hurd added that there are two specimens of this katydid at the University of California, collected in Niles Canyon in 1932, and at Sunnyvale in 1941.

Mr. Day introduced Mr. J. G. Rozen, of the University of California, who spoke on the subject "Comparative Behavior of the Bees of the Genus *Nomadopsis*." His address was accompanied by slides to illustrate graphically the phylogenetic relationships between the species. Mr. Rozen's discussion is summarized below.

The genus *Nomadopsis* consists of some thirty species, twenty-five of which occur in California. These bees are non-social. Although they may nest in a localized area, there is no queen; each female digs and provisions her own nest. Nests are made in the ground and each cell is provisioned with a pollen ball, upon which a single egg is laid. The genus is divided into three rather distinct subgenera, one of which is composed of three species groups.

In addition to morphological characters used in making these separations, it is possible to make much the same separations based on behavior patterns. By far the most distinctive of these are the mating habits which may vary in method of approach by the male, in position and duration of copulation. In one subgenus, for instance, the union may last for an hour, while in another the rough and tumble mating seldom exceeds five seconds in duration. Nesting habits vary, for the burrow may be shallow or deep, straight or curved, contain a single cell in each side branch, or two or three in a series. Seasonal cycles vary from one to several generations per year. With respect to the diurnal cycle the bees are usually active during the warm part of the day but they are attuned to the pollen flower and may be active early or late in the day depending on the time the flower opens and closes. "Monolectic" species limit themselves to the pollen

of a single species of plant; "oligolectic" ones have the choice of several plants; while "polylectic" species may collect pollen from many different species of plants. Certain morphological differences permit various species to collect pollen from deep-throated flowers, while other bees with short mouthparts feed on open flowers.

The meeting was adjourned.—L. R. GILLOGLY, *Secretary* pro tem.

Two Hundred and Forty-first Meeting

The two hundred and forty-first meeting of the Pacific Coast Entomological Society was held at 2:00 p.m. on Saturday, March 5, 1955, in the Morrison Auditorium of the California Academy of Sciences, San Francisco. President W. C. Day conducted the meeting. The following members were present: D. D. Jensen, P. S. Bartholomew, L. R. Gillogly, G. E. Bohart, H. B. Leech, J. W. MacSwain, J. G. Edwards, J. W. Green, K. F. Innes, E. L. Kessel, R. D. Cuyler, S. W. Hitchcock, A. E. Pritchard, L. M. Henry, G. F. Ferris, R. L. Usinger, F. E. Skinner, B. McDaniel, J. H. Freitag, N. W. Frazier and W. C. Day.

Visitors were present as follows: J. A. Reed, Alan Gillogly, Mrs. L. R. Gillogly, James Gillogly, George Provin, W. A. Russell, J. K. Holloway, Paul Remy, Dr. and Mrs. R. De Coursey, Mrs. S. W. Hitchcock, Peter Wygodzinsky, and A. R. Hill.

The minutes of the meeting held February 4, 1955, were read and approved.

Gordon Bender, Duncan Cuyler, Samuel Gottfried, and Henry Taaber were elected to full membership in the Society.

In response to the President's call for notes and exhibits, Dr. Edward Bohart showed pictures of the wild bee, *Anthophora occidentalis* Cresson, its burrows in vertical banks and its parasite. The pictures were made in Utah.

Professor Ferris exhibited his latest volume (number 7) of the Atlas of the Scale Insects of North America.

President Day then introduced as the main speaker of the meeting, Mr. James K. Holloway, Entomologist of the U. S. Department of Agriculture and the University of California, who spoke on the subject, "Searching for Natural Enemies of the Sugar Beet Leafhopper in Spain and North Africa." Mr. Holloway's talk, which was illustrated with excellent colored pictures, is summarized below.

In searching for natural enemies of an introduced insect species it is very desirable to know the country of origin. The beet leafhopper was thought to have originated in the western hemisphere. Exploration in Central and South America failed to locate the species. In the course of a long series of taxonomic studies, Dr. P. W. Oman decided that the beet leafhopper belonged in the genus *Circulifer*. He recognized some 12 Old World species of the genus which were generally distributed in the countries of the Mediterranean. In 1948, Oman published an article in which he found two species described, one from Palestine and the other from Sicily, to be synonymous with the North American beet leafhopper. This finding opened up a whole new area for parasite exploration. As a preliminary to this project, Dr. Norman Frazier was sent on a seven-month survey of the

Mediterranean countries. He definitely determined the existence of *Circulifer* in these countries and recommended that we search in Spain and North Africa for natural enemies.

In March 1952, we sailed from New York to Barcelona with a station wagon equipped as a field laboratory.

The first problem pertaining to the field work was a big one, because *Circulifer* were not insects of economic importance in Spain and there were no taxonomists in that country who had worked on the group. Therefore, there were no distribution records available. In the United States we know that the beet leafhopper is generally found in areas of 12 or less inches of rain and is associated with certain preferred host plants. Fortunately, the botanical and meteorological records were good in Spain and from these a probable collecting area was determined. The family Chenopodiaceae was used as a plant index. This family includes many of the preferred host plant genera such as *Atriplex*, *Salsola*, *Bassia*, and others. A rough sketch of the distribution was placed on a map of Spain and upon this was placed areas of 10 or less inches of rain. This solved the problem of the part of Spain in which to search.

No parasites or predators of the adults or nymphs were found in sufficient quantity to make shipments. Several egg parasites from Spain were received in quarantine at Albany, California and from these, three readily accepted the eggs of *Circulifer tenellus*.

Approximately four months, January through April, 1953, were spent in North Africa in the following countries: Spanish Morocco, Tangier, French Morocco and Algier. It was hoped that the warmer climate of these countries would permit some winter work. Unfortunately, most of the suitable collecting areas were at from 2,000 to 3,000 feet elevation. Under desert conditions at that time of the year, there were a few hours during mid-day which were warm enough for insect activity but the nights were so cold it more than offset the activities resulting from mid-day temperatures. However, in southern French Morocco below the Atlas Mountains and along the Atlantic ocean, an area was found in which working populations of *Circulifer tenellus* were obtainable. From this locality one egg parasite was obtained and is now being released.

Mr. Holloway's report was followed by short discussion after which the meeting was adjourned.—D. D. JENSEN, *Secretary*.

Two Hundred and Forty-second Meeting

The two hundred and forty-second meeting of the Pacific Coast Entomological Society was held at 7:30 p.m. on Friday, April 15, 1955, at the California Academy of Sciences, San Francisco. President W. C. Day conducted the meeting. The following members were present: D. D. Jensen, P. Bartholomew, L. R. Gillogly, G. E. Bohart, H. B. Leech, J. W. MacSwain, J. G. Edwards, J. W. Green, K. F. Innes, E. L. Kessel, R. D. Cuyler, S. W. Hitchcock, A. E. Pritchard, L. M. Henry, G. F. Ferris, R. L. Usinger, P. D. Hurd, F. E. Skinner, B. McDaniel, J. H. Freitag, N. W. Frazier, and W. C. Day. Visitors were present as follows: J. A. Reed, Alan Gillogly, Mrs. L. R. Gillogly, James Gillogly, G. Provin, W. A. Russell, J. K. Holloway,

P. Remy, Dr. and Mrs. R. M DeCoursey, Mrs. S. W. Hitchcock, P. Wygodzinsky, and A. R. Hill.

The minutes of the meeting held March 5, 1955, were read and approved..

Dr. Hurd reported that the annual field meeting would be held at Russellman Park, Contra Costa County, on May 14, 1955.

President Day reported on the publication status of volume 2 of the Society's Memoirs Series, "A Revision of the Spider Mite Family Tetranychidae" by A. E. Pritchard and E. W. Baker, indicating it would be ready for distribution in the near future.

A motion was passed instructing the Membership Committee to write letters to members of the Society who are delinquent in their dues encouraging them to continue active participation in the Sociey.

In response to the President's call for notes and exhibits, Dr. Hurd reported on limestone nodules containing fossil insects of cretaceous age from the Calico Mountains of California.

Mr. Day reported that in one group of mayflies, three species had been named on the basis of the form of one structure. He has found that when the mayflies are killed in a killing jar with ethyl acetate this structure appears identical in all.

Mr. Day introduced as the main speaker of the meeting Dr. A. R. Hill, Department of Zoology, Glasgow University, whose subject was, "Some observations on *Anthocoris* spp." A summary of Dr. Hill's remarks follows.

Anthocoris bugs belong to the family Anthocoridae of the suborder Heteroptera. They are commonly called Flower Bugs or Minute Pirate Bugs. They are characterized by possessing 4-segmented antennae, by the absence of ocelli and by the elytra showing a distinct cuneus and embolium. In color they are generally black and brown with either white or cream-colored markings.

They are free-living insects to be found on a variety of shrubs, trees and flowers, under fallen leaves, under bark, in moss, etc. Carnivorous in habit, they feed on mites, thrips, leafheppers, aphids, coccids and other small insects and arthropods. Some have been reported as damaging cultivated plants but this is rather unusual. There are approximately 40 species recorded in the world list.

These insects, because of their small size and inconspicuous coloring have been little studied, so that there is a lack of information about their life-histories, their geographical distribution and their distribution on plants. Practically nothing is known about their feeding habits, which organisms form their prey and to what extent they inbibe plant juices. More information as to the role these insects play in reducing and stabilizing populations of pest species such as red spider mites, aphids, etc. would be of considerable practical importance. It was for these reasons that the lecturer began his study of British *Anthocoris* species last year. The work is still in the preliminary stages. Distribution records have been obtained from literature and supplemented by field studies and life history. Studies have been performed on two species, *Anthocoris nemorum* (L) and *A. confusus* Reuter. The former species, which is very common and widely

distributed, proved the easier to rear in the laboratory. Exact data on duration of stadia and on quantities of aphids consumed during the developmental and post-developmental periods have been ascertained.

Anthocoris nemorum completes its developmental period in 48 days consuming some 57 aphids during that time. For *A. confusus* the figures are 28 days and 35 aphids for the spring generation and 32 days and 40 aphids for the summer generation (the figures are averages). In the case of *A. nemorum* there are strong indications that it is univoltine in Scotland, whereas, in England, it is bivoltine.

Very little seems to be known of the North American species which have not been treated as a group since O. M. Reuter's monograph (1884). The author has made a study of these and hopes to publish a key for their identification in the near future.

Following a discussion of Dr. Hill's talk, the meeting was adjourned.—D. D. JENSEN, *Secretary.*

Two Hundred and Forty-third Meeting

The annual field meeting of the Pacific Coast Entomological Society was held at Russelman Park, Contra Costa County, May 14, 1955. The following members were present: E. S. Ross, W. C. Day, J. G. Rozen, H. B. Leech, W. Hovanitz, Don Burdick, R. F. Smith, J. W. MacSwain, and Jane MacSwain. Visitors were present as follows: Mrs. W. C. Day, Dr. and Mrs. R. M. DeCoursey, Mr. and Mrs. W. A. Russell, Laurel Cummings, Mrs. R. F. Smith and children.

Unforeseeable scheduling difficulties prevented the attendance of many members who had hoped to repeat the successful field meeting that had been held at the same location last year. This was particularly regrettable since, with the lateness of the season this year, there was an abundance of flowering plants throughout the area. However, those present enjoyed the opportunities for collecting and visiting under ideal weather conditions. —J. W. MACSWAIN, *Secretary pro tem.*

Two Hundred and Forty-fourth Meeting

The two hundred and forty-fourth meeting of the Pacific Coast Entomological Society was held at 2:00 p.m. on Saturday, October 29, 1955, at the California Academy of Sciences, San Francisco. President W. C. Day conducted the meeting. The following were elected to membership in the Society: Anthony Ross, Donald Maddox, Jerry A. Powell, and Richard Wilkey.

The following members were present: W. W. Middlekauff, E. O. Essig, E. S. Ross, K. S. Hagen, L. R. Gillogly, P. A. Bartholomew, J. W. MacSwain, J. W. Tilden, G. M. Cagley, W. Hovanitz, H. B. Leech, W. A. Doalin, Berta Kessel, E. L. Kessel, Jerry Powell, D. D. Linsdale, J. W. Green, S. W. Hitchcock, C. D. MacNeill, D. H. Denning, P. D. Hurd, R. F. Smith, E. Swift, D. P. Furman, Otto Graf, Victor Stombler, W. C. Day, and D. D. Jensen. The following visitors were present: Don Smith, Riley Swift, Philip Furman, Byron Furman, Lynne Furman, Kathy Smith, Mary Swift, Tim Swift, Tommy Smith, Mrs. L. R. Gillogly, Alan Gillogly, Jim Gillogly,

David Bartholomew, John M. Beak, David W. Davies, Charles Cushner, R. L. Goodenough, Charles A. Koepke III, P. Wygodzinsky, Paul Surany, Bob Pacheco, Paul Johnson, M. A. Barber, Iola W. Barber, Mrs. W. C. Day, Sue Roberts, Eugene King, Marsh Pitman, George Johnson, Jo Johnson, Celeste Green, Grace Hurd, Kathryn Mcnulty, Kathleen Green, James Tyler, Bernard J. Adelson, James D. Denning, Richard A. Torkelson, Mrs. D. G. Denning, Libby Smith, G. Provin, Mrs. E. Swift, Mrs. D. P. Furman, John Hendrickson, and David Rentz.

The minutes of the meetings held April 15 and May 14, 1955, were read and approved.

President Day reported that the Society's second memoir, "The Revision of the Spider Mite Family Tetranychidae" by Pritchard and Baker, had been published and had already sold 186 copies.

A motion was made and passed approving the action taken by the Executive Board in amending the By-laws of the Society to add an advertizing committee to the standing committees of the Society.

President Day appointed the following members to serve as a nominating committee to propose a slate of officers for 1956 at the December meeting: Dr. Hurd, Dr. Ross and Dr. Tilden.

In response to the President's call for notes and exhibits Dr. MacSwain showed photographs of the eggs of five genera of Coniopterygids and commented briefly on the striking differences in oviposition habit. In addition, he exhibited a colored slide of one of the trash-carrying larvae of the genus *Eremochrysa* of the Chrysopidae.

Dr. Tilden reported two collections: A bee taken in a mosquito light trap, on July 27, 1954, at Santa Clara, California.

A balloon fly was taken on the old alignment of the Los Gatos-Santa Cruz Highway, about two miles west of Holy City, and not far from the marker for the ghost town of Patchen, March 19, 1955. The fly was flying very slowly and not far from the ground, perhaps eight feet. The balloon was very white and was what attracted attention. No others were seen.

Hugh B. Leech mentioned the following collections received by the Department of Entomology of the California Academy of Sciences:

(1) Several thousand specimens taken by Dr. L. W. Swan of San Francisco State College, on the California Himalaya Expedition of 1954, to Makalu, the 27,790 ft. peak some 15 miles from Mt. Everest. The collections were made in the Arun valley of eastern Nepal; those from the floor of the valley are chiefly from elevations of 1,000 to 5,000 ft., but those from base camp on the mountain are from 12,000 to 20,000 ft.

(2) The Harry P. Chandler collection. This has not been completely accesioned yet, but contains some 16,000 well mounted and labeled specimens. It is strongest in Coleoptera, especially aquatic species, but contains aquatics of other orders, and a general coverage of orders.

(3) Almost 800 Australian beetles, chiefly a named collection of ground weevils. These comprise the subfamily Amycterinae, which is restricted to Australia. There is also a set of Ferguson's revisional papers on the subfamily which comprised part of the Deuquet collection. These are a gift of Mr. E. R. Leach.

(4) 2,500 coprine Scarabaeidae, nearly all exotics which are a gift from E. R. Leach, and from his collection.

Dr. Ray F. Smith reported that the spotted alfalfa aphid, *Therioaphis maculata* (Buckton), is the most serious pest of alfalfa that has ever been introduced into California. It first appeared in a few localities in southern California early in 1954. It caused serious damage in that area during the 1954 growing season. It was first found in northern California in January, 1955 in Kern County. All major alfalfa growing areas in the Central Valley and in the coastal areas as far north as San Jose are infested. It is of significance not only because of its damage to alfalfa but because of its impact on other aphids and their natural enemies.

President Day introduced Dr. E. S. Ross, of the California Academy of Sciences, who spoke on "An Entomological Expedition to the Andes." His talk, which was illustrated with superb colored pictures, is summarized below.

Between September, 1954 and April, 1955, Dr. Ross, Curator of Entomology at the California Academy of Sciences, in company with Mrs. Ross and Mr. E. I. Schlinger of the University of California at Davis, conducted an entomological expedition to the Andean region of Peru, Ecuador, and Colombia. The principal purpose of this field work was to photograph the appearance and habits of living insects in tropical environments. This work was supported by a grant from the John Simon Guggenheim Foundation. A secondary activity was a study of the biology and evolution of the Embioptera. Mr. Schlinger's objectives were to study flies of the family Acroceridae and to make a general collection of insects of the many regions visited.

Approximately ten thousand photographs were made, nearly a hundred new species of Embioptera were discovered and studied, and about 200,000 insects of all orders were collected.

Using a selection of Kodachromes, Dr. Ross traced the activities of the expedition from its base in Lima, Peru to its termination at Buenaventura, Colombia. Before crossing the Andes to reach the principal work area, Tingo Maria, field work was conducted in the coastal lomas in the deserts north and south of Lima. By September 18 the group had begun to work out of the experiment station at Tingo Maria on the upper Huallaga River. From this base the group radiated each day by truck to suitable areas from high Carpish Mountain cloud forests to the west, eastward to the Amazonian plains near Pucallpa. Upon completion of four profitable months of such activity, the party returned to Lima on January 12. Here the accumulated collections were shipped to San Francisco and the truck was made ready for its difficult northward journey.

Between January 14 and March 30, most of the major life zones of northern Peru, Ecuador, and Colombia were briefly visited. The principal purpose of this phase of the expedition was to increase the coverage of the Embioptera and acrocerid collections. Diversions down the upper Pastaza River of Ecuador, the upper Putomayo of southern Colombia, and to Villavicencio in northern Colombia, resulted in valuable comparative collections from life zones comparable to those intensively collected in central Peru.

More than one hundred Kodachromes were shown, many of which illustrated hitherto unphotographed tropical insects and the biological phenomena they exemplify. Particularly instructive was the large series showing the diverse methods by which insects reduce predation through camouflage and mimicry.

Following the lecture by Dr. Ross the meeting was adjourned.—D. D. JENSEN, *Secretary*.

Two Hundred and Forty-fifth Meeting

The two hundred and forty-fifth meeting of the Pacific Coast Entomological Society was held at 2:00 p.m. on Saturday, December 3, 1955, in the Morrison Auditorium of the California Academy of Sciences, San Francisco. President W. C. Day conducted the meeting. The following members were present: R. C. Miller, D. D. Jensen, R. L. Usinger, D. P. Furman, E. G. Linsley, J. W. MacSwain, P. A. Harvey, L. R. Gillogly, W. W. Middlekauff, A. E. Michelbacher, E. O. Essig, J. G. Edwards, E. L. Kessel, Victor Stombler, G. F. Ferris, Laura Henry, J. W. Tilden, William Hovanitz, Walter Thomsen, Donald Linsdale, M. Wasbauer, Don Burdick, J. J. Drea, K. S. Hagen, J. E Swift, R F. Smith, Donald Maddox, Anthony Ross, Allan Samuelson, Jerry Powell, J. W. Green, G. M. Caglev, and W. C. Day. Visitors were present as follows: Dolores Damian, C. Joan Worthington, Richard Schonert, Jean Johnson, James E. Harvey, Philip Torchir, Peter H. Westigard, Dave Ribbee, Bernard Adelson, Derham Giuliani, William Russell, J. A. Hendrickson, Jr., Jim Gillogly, Alan Gillogly, Mrs. Lorin R. Gillogly, Mrs. W. C. Day, G. Provin, James W. Chapman, Neil A. Walker, Don Sanders, Fred Mosslarger, Harlan L. Smith, Myron Gershenson, and Paul Opler.

The minutes of the meeting held October 29, 1955, were read and approved.

Myron Gershenson, Jon Herring and Harlan L. Smith were elected to membership in the Society.

President Day appointed Dr. Jensen to serve on the membership committee.

In response to the President's call for notes and exhibits, Dr. Edwards showed three colored slides. One was a picture of a large mass of yellow Collembola on and adjacent to a snow bank at an elevation of 6500 feet in Glacier National Park, Montana. The picture was taken in July 1955. The second slide was of a peculiar moth larva eating prune leaves near Sunnyvale, California, November 1955. It was reared to the adult stage in the laboratory in about one month. The species has not been identified but may belong in or near the genus *Schizura*. The third slide showed a scorpion carrying three white young scorpions on its back. It was a species collected from the Santa Cruz Mountains of California.

Dr. Kessel stated that the balloon fly collected by Dr. Tilden near Holy City, Santa Cruz Mountains, and reported at the October meeting, is *Empimorpha geneatis* Melander. The type for this species was collected in 1902 from somewhere in California. Otherwise it has been taken only in Corte Madera Canyon, Marin County, by both Dr. Ross and Dr. Kessel.

Dr. Ross projected and discussed two Kodachromes illustrating pollen-

ization of *Aristolochia*. Gnats, chiefly of the family Fungivoridae, are attracted to the flowers because of their musky odor. Once in the flowers the flies move upward to the stamens and pistil because of the light transmission of the corolla wall which is pale around these parts. No light is visible in the direction of the flower opening because of its twisted shape and dark pigmentation. Once the pistil is fertilized, the bag-like corolla wilts, the light trap opens, and the flies can escape. Bearing the pollen of such flowers, they may then enter another flower and cause cross-fertilization.

Dr. Usinger exhibited several species of Microphysidae collected or reared by Dr. E. S. Ross from webs of Embioptera in South America. These proved to be new species of the interesting and hitherto monotypic genus *Embiophila* described by Dr. W. E. China from Trinidad. Judging by the species now before us, this promises to be a large and rather homogeneous genus confined to Embiid webs in the New World tropics.

Dr. Tilden reported that the nominating committee proposed the following as officers of the Society for 1956: Hugh B. Leech, President; W. W. Middlekauff, Vice-President; D. P. Furman, Secretary; R. C. Miller, Treasurer; G. F. Ferris, Member-at-Large. They were unanimously elected.

The chairmanship of the meeting was then turned over to President-elect Leech who called on Mr. Day to give his presidential address entitled "Some Adaptations Among the Mayflies."

Before the meeting was adjourned, questions from the audience elicited from Mr. Day an interesting description of methods of collecting and rearing mayflies.—D. D. JENSEN, *Secretary*.